THE WALTER REED ARMY INSTITUTE OF RESEARCH ENVIRONMENTAL ASSESSMENT (FINAL)

Prepared For:

Headquarters
U.S. Army Medical Research and Development Command
Fort Detrick, Frederick, Maryland

Prepared By:
Walter Reed Army Institute of Research
Washington, DC
with Technical Assistance from
Telemarc, Inc.
Fairfax, Virginia

Contract No. DAMD17-91-D-10

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DEPARTMENT OF THE ARMY U.S. Army Medical Research and Development Command Walter Reed Army Institute of Research Washington, DC 20307-5100

ENVIRONMENTAL ASSESSMENT

The Walter Reed Army Institute of Research (WRAIR)

February 1993

Prepared by the WRAIR

Reviewed by:

William H. Bancroft, COL, MC

Director, Military Disease Hazards Program, USAMRDC

Reviewed by:

Kenneth E. Spencer, COL, MS

Executive Officer

WRAIR

Reviewed by:

Robert J. Carton, Ph.D.

Environmental Officer, USAMRDC

APPROVED BY:

AUGUST J. SALVADO, COL, MC

Director, WRAIR

Reviewed by:

Anna Johnson-Winegar, Ph.D. Director, Medical Biological

Defense Program, USAMRDC

Bert Mueck Safety Officer

WRAIR

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EXECUTIVE SUMMARY

This Environmental Assessment, *The Walter Reed Army Institute of Research Environmental Assessment*, was researched and prepared by the Walter Reed Army Institute of Research (WRAIR) with technical assistance by Telemarc, Inc., of Fairfax, Virginia, under Contract DAMD17-91-D-1006 for the U.S. Army Medical Research and Development Command (USAMRDC).

The WRAIR is the lead Department of Defense (DoD) medical research laboratory for protecting service men and women against naturally occurring infectious diseases of particular significance for military operations. The WRAIR is a tenant activity of the Walter Reed Army Medical Center (WRAMC), with facilities located in Washington, DC (WRAIR Main) and the Forest Glen Section of the WRAMC, Montgomery County, Maryland (WRAIR Forest Glen), collectively referred to as the WRAIR.

The majority of WRAIR activities are currently conducted in Building 40 (WRAIR Main) which has several deficiencies which make compliance with DoD regulations and federal laws concerning environmental protection and staff safety exceptionally difficult. The Army is relocating and consolidating the operations of the WRAIR at new facilities to be constructed at the Forest Glen Section of the WRAMC (hereinafter, the New WRAIR). Construction of the New WRAIR previously underwent environmental review in the Revised Master Plan Forest Glen Section. Walter Reed Army Medical Center (Rogers, Golden & Halpern, 1990) (hereinafter, The New WRAIR EA).

The proposed action (preferred alternative) is to continue operations, at the WRAIR Main and the WRAIR Forest Glen in their present scope and size, until such time that operations commence at the New WRAIR There are three reasonable alternatives to the proposed action: (1) continue operations at the existing facilities in their present scope and size into the distant future; (2) temporary transfer of operations to another location; and (3) no action (cease the WRAIR operations). The proposed action and alternatives considered were analyzed relative to the current and future mission requirements of the WRAIR to determine the current and potential environmental consequences of routine operations. This environmental assessment determined that the proposed action (preferred alternative) does not cause significant adverse impacts upon the environment, has more positive attributes than the other alternatives, and is the alternative which best meets the current and future mission requirements of the WRAIR.

This Environmental Assessment was prepared in accordance with the guidance provided in Army Regulation 200-2 and adheres to requirements, set forth in the National Environmental Policy Act (NEPA). The nature of the research and activities conducted at the WRAIR, the internal environment, the associated risks and issues, and the security and safety of operations were systematically reviewed. Particular attention was given to accident and emergency procedures and to several special considerations connected with the unique mission of the WRAIR. WRAIR operations were reviewed in detail within the context of the surrounding physical, biological, and socioeconomic environment. Feasible alternatives with regard to needs of the United States and the Army and potential adverse effects on the environment were also evaluated.

The principal conclusions of the report are: (1) current risks to the environment associated with accidental release of dangerous substances or hazardous organisms from the conduct of routine operations are extremely small; (2) structural deficiencies associated with the current physical facilities pose, in the near-term, a minor risk to worker health and safety; and therefore, (3) continued operation of the WRAIR pending commencement of operations at the New WRAIR will result in no significant adverse impacts and will result in significant benefits to the United States.

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1.0 PURPOSE AND NEED FOR PROPOSED ACTION

1.1 Introduction

This Environmental Assessment (EA) evaluates the environmental impacts of the Walter Reed Army Institute of Research (WRAIR). The WRAIR is a subordinate laboratory of the U.S. Army Medical Research and Development Command (USAMRDC) which plans, programs, budgets, and executes the Army Medical Research, Development, Test, and Evaluation (RDT&E) program. The WRAIR is the primary medical research organization in the Department of Defense (DoD) and is the largest laboratory in the USAMRDC (see Section 2.2). The WRAIR is involved in various aspects of the activities directed by the Headquarters, USAMRDC and is the lead DoD medical research laboratory for protecting service men and women against infectious diseases of military importance.

The WRAIR activities are performed under several programs funded by Congress and implemented through the DoD by the Department of the Army (DA). These programs include the Infectious Disease Research Program (IDRP),), the military Human Immunodeficiency Virus Research Program (HIVP),), and the medical Biological Defense Research Program (BDRP).). The mission of the IDRP is to preserve soldier performance by preventing infectious diseases (parasitic, bacterial, viral). Similarly, the mission of the HIVP is to protect personnel from HIV infection, arrest development of disease (AIDS) and its progression in those who become infected, and improve early diagnosis of infection. The mission of the BDRP is to protect U.S. forces from the effects of biological or toxin agent weapons, to diagnose and treat disease from exposure to such agents, and, through such activities, to deter, constrain, and defeat the hostile use of such agents. The WRAIR is a participating laboratory of the medical portion of the BDRP (one of approximately 50 secondary sites conducting BDRP research) studying basic mechanisms of action of infectious organisms and their toxins and of neuroactive compounds.

1.2 Description of the Proposed Action

The WRAIR is a tenant organization of the Walter Reed Army Medical Center WRAMC) with facilities located in Washington, DC (WRAIR Main), and Forest Glen, Maryland (WRAIR Forest Glen). The major portion of activities conducted by the WRAIR are performed in Building 40 at WRAIR Main. This facility was originally designed for use as a school and office building and dates, in part, from 1923. The efficiency of WRAIR operations is diminished by the inadequate physical condition of Building 40 and by the unconsolidated geographic nature of the WRAMC and the WRAIR. Although little land is available at the WRAMC complex in Washington, DC, land suitable for construction is available at the WRAMC Forest Glen complex in Maryland.

The U.S. Army proposes to continue WRAIR operations in their present facilities (WRAIR Main and WRAIR Forest Glen), at their present scope and size, until the time

(anticipated to be 1997) that a new building can be constructed at Forest Glen. Alternatives to the proposed action which have been considered in this EA are detailed in Section 3.0.

1.3 Tiering

Army Regulation (AR) 200-2 (32 CFR, Part 651) provides guidance for preparation of EAs for Army actions, including adherence to requirements set forth in the National Environmental Policy Act (NEPA) and implementing regulations. To reduce redundancy with previous relevant documents and to meet the requirements of the Council on Environmental Quality (CEQ) (40 CFR, Parts 1500-1508), this EA is tiered, in part, to earlier NEPA documentation. This approach entails referencing specific analyses, discussions, and conclusions of these documents without providing detailed discussions in the present EA.

For tiering purposes, two groups of previous documents are relevant to the EA for the WRAIR. The first group of documents consists of those reports and assessments related to the WRAMC: Environmental Science and Engineering, 1984; Kise Franks & Straw, 1990a, 1990b; Rogers Golden & Halpern, 1990 (The New WRAIR EA). Primary among this group is the Revised Master Plan. Forest Glen Section. Walter Reed Army Medical Center (The New WRAIR EA). These documents provide site-specific information about the environmental setting of the WRAIR. The second group of documents includes material previously evaluated in a programmatic context. The BDRP was evaluated prior to the preparation of this EA (BDRP FPEIS, 1989). In 1989, the DoD prepared a Final Programmatic Environmental Impact Statement (FPEIS) on the environmental effects related to the BDRP. The Record of Decision (ROD) indicated that, although certain aspects of the program remain controversial, particularly those aspects relative to aerosol testing and the use of genetically engineered microorganisms (GEMs), the program remains unaltered because the environmental analysis found no evidence of major negative environmental impacts (Appendix A).

The BDRP FPEIS developed program-specific Risk/Issue category assignments to evaluate the effects of BDRP activities on the environment. Although the Risk/Issue categories used to evaluate environmental effects in the BDRP FPEIS are not directly transferable to the other programs conducted at the WRAIR (see Section 1.1), the programmatic evaluation performed for the BDRP provides a useful basis for analyzing the potential impacts *of all* the WRAIR activities (see Section 5.0). Because the IDRP HIVP, and BDRP apply parallel research methods and safety/containment procedures, the assumptions used, and the conclusions reached, in the BDRP FPEIS apply as well to the IDRP and HIVP The activities associated with the actual work, not the source of funding for the work, determine environmental impacts (see Section 25). This approach is consistent with AR 200-2 (Section 2-6c) and the CEQ regulations [40 CFR Parts 1502.20, 1502.4(d), 1508.28(a)].

Two components of the WRAIR, the Division of Retrovirology and the Department of Cellular Immunology, conduct research under the IDRP, HIVP, and BDRP in leased space in Rockville, Maryland. A separate EA is being prepared for these WRAIR activities WRAIR,, 1993).

1.4 Public Evaluation

Various public and government groups were involved with the preparation and completion of the BDRP FPEIS. The dialogues resulting from these meetings and multidisciplinary, multidimensional analyses indicated that public concerns expressed at the local level were programmatic in nature and not directly related to specific sites within the BDRP. The BDRP FPEIS found that any adverse impacts associated with continuation of BDRP research efforts were minimal.

The WRAIR was not intensely analyzed in the BDRP FPEIS. In this EA, the WRAIR is evaluated on a site-specific basis to determine the environmental impacts of the continuation of its operations at their present locations until such time that the New WRAIR becomes operational. This EA also examines other alternatives to this proposed action including: 1) continuing operations, at the existing facilities in their present scope and size, into the distant future, 2) temporary transfer of operations to another location, and 3) no action (cease operations) (see Section 3.0). The portion of the proposed action which includes construction of a new WRAIR facility at WRAMC, Forest Glen, Maryland, has been previously evaluated in the New WRAIR EA That EA concluded that no significant adverse environmental impacts would be associated with the construction and operations, at Forest Glen, of a new WRAIR facility.

2.0 DESCRIPTION OF THE WRAIR

2.1 Location and Facilities

The WRAIR is presently located at the WRAMC, Washington, D.C. (WRAIR Main) and the Forest Glen Section of WRAMC, Montgomery County, Maryland (WRAIR Forest Glen), collectively referred to as WRAIR. The WRAIR has been a tenant activity of WRAMC since 1925. The WRAIR facilities examined in this EA are WRAIR Main and WRAIR Forest Glen. The facilities are diverse in design, age, and level of permanence. Currently, WRAIR occupies 14 buildings, 6 trailers, and leased space. A separate EA is being prepared for WRAIR activities located in leased space (WRAIR, 1993). Plans to construct a single new building to house WRAIR activities at Forest Glen, Maryland (New WRAIR) have also been evaluated in a separate EA (T he New WRAIR EA).

WRAIR Main is located on the grounds of the WRAMC installation along with the hospital, training facilities, and functional support facilities. The WRAMC installation is bounded by 16th Street, Alaska Avenue, Georgia Avenue, Fern Street, and Aspen Street (Figure 2-1). The Army Medical School, the nation's first school of preventive medicine and predecessor to the WRAIR, was founded in 1893. The Army Medical School was first located at 7th and B Streets, S.W., in Washington, DC. In 1923, a building was constructed on a site adjacent to the Walter Reed Hospital, now the WRAMC. At that time, the Army Medical School merged with the Veterinary School, Dental School, and the Army School of Nursing to form the Medical Department Professional Schools. This structure today serves as the south wing of WRAIR Main Building 40. Building 40, WRAIR Main, is the principal laboratory facility of the WRAIR. Building 40 also houses the U.S. Army Institute of Dental Research (USAIDR). Building 40 is a 276,182 gross square foot (gsf) building originally constructed in 1923 to serve as a teaching facility for the Army Medical School. The building has undergone much renovation and remodeling since that time in order to accommodate the needs of the WRAIR's growing research programs (Tyner, 1991). The WRAIR also currently uses two office buildings (combined 34,874 gsf) for administrative purposes at the WRAIR Main.

The WRAIR Forest Glen is located on 182.5 acres in the Silver Spring area of Montgomery County, Maryland, about three miles north of the WRAMC (Figure 2-2). To the north of the WRAIR Forest Glen is the Capital Beltway. The CSX railroad and Brookeville Road are to the east. Access to WRAIR Forest Glen is via Forest Glen Road, Linden Lane, and Brookeville Road. The Forest Glen property was purchased just prior to the entry of the U.S. into World War II when the buildings located on the property were renovated as a convalescent center. The WRAMC Forest Glen complex served as a convalescent center until 1946. Currently, WRAIR Forest Glen activities occupy 14 buildings and 7 trailers providing a combined 211,340 gsf (Tyner, 1991).

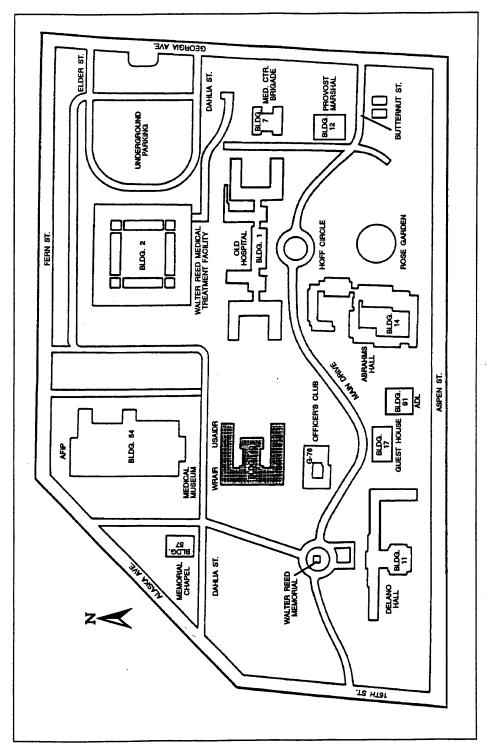


Figure 2-1 Location of Building 40 of WRAIR Main

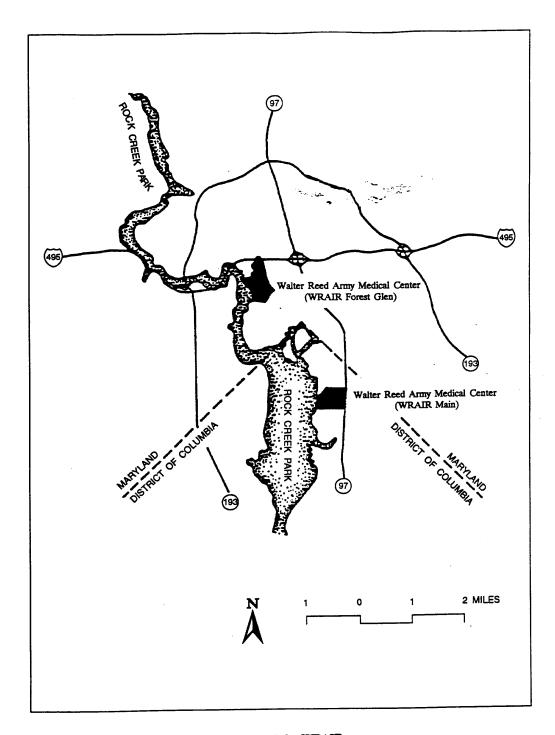


Figure 2-2 Locations of the WRAIR

The Department of Microwave Research is located in WRAIR Forest Glen Building 502. This building was constructed in 1954 and renovated as a microwave facility in the 1970's. The facility is a government owned/contractor operated (GOCO) facility. The contractor operating the facility is ERCI Facilities Services Corporation (USAMRDC Contract Number DAMD17-89-C-902 Typically, 18-21 employees work at this facility.

2.2 Mission

Research is the fundamental component of the WRAIR mission. WRAIR research activities are directed towards the development of products and strategies for countering threats from three sources: biologically active substances (see Section 2.4.1), high energy and trauma (see Section 2.4.2), and stress and performance (see Section 2.43). Several divisions and/or disciplines within a division may be engaged in implementing the WRAIR mission to counter a particular threat. Each WRAIR division is divided into departments on the basis of subdisciplines (see Sections 23.1 through 23.9). The WRAIR provides general military medicine capability and conducts research in communicable diseases and diseases caused by unusual etiologic agents, combat surgery, combat psychiatry, drug development, military hazards of blast overpressure, biological toxins, chemical and nuclear warfare defense, and the biological effects of microwaves (WRAIR, 1992).

The WRAIR mission also includes training. The WRAIR plans and presents undergraduate and graduate level education and training programs which provide experienced medical research personnel to the Army Medical Department. Activities undertaken in the training component of the WRAIR mission include the U.S. Army General Preventive Medicine Residency Program and the training of Animal Care Specialists for all branches of the Department of Defense.

In addition to its role in research and training, the WRAIR provides Support and consultation in its areas of expertise to other DA, DoD, and civilian agencies and organizations. The WRAIR provides:

- Epidemiologic consultation for the Office of the Surgeon General (OTSG) and other agencies.
- Advice to the AMEDD in military medicine; technical quality control, where required, and biological products development studies.
- Diagnostic support in situations requiring complicated analyses or tests not otherwise available at Army installations.
- Technical supervision of extramural contracts and grants specifically related to WRAIR in-house programs.

- · Command, control, technical supervision, and support for the collaborative research studies of WRAIR Special Foreign Activities (WRAIR, SFA), and Continental United States based USA Medical Research Units.
- · Technical guidance in product development to the U.S. Army Medical Materiel Development Agency (USAMMDA) technical base initiatives.

Details of the missions and activities of eight of WRAIR's scientific divisions follow. The Division of Retrovirology and the Department of Cellular Immunology (Division of Communicable Diseases and Immunology) are being examined in other NEPA documentation (WRAIR, 1993) because they are located in leased space outside the WRAIR Main and the WRAIR Forest Glen of WRAMC

2.3 Organization

The WRAIR is a subordinate laboratory of the USAMRDC and a tenant organization of the WRAMC The WRAIR is the primary medical Research and Development (R&D) organization in the DoD and the largest laboratory in the USAMRDC. The WRAIR is the congressionally-designated lead agency for the DoD for the IDRP and HIVP. The WRAIR received \$34.2 million of the \$525 million budgeted for the IDRP in fiscal year (FY) 1991 and \$5.3 million of the \$44.0 million of the FY 1991 budget for HIVP. The WRAIR is involved to a lesser extent in other medical R&D programs including the BDRP (\$8.7 million of \$75.1 million) and Combat Casualty Care (\$1.4 million of \$24.3 million).

The WRAIR is organized into nine scientific divisions, seven support divisions, and if e special field activity laboratories. The scientific divisions are Biochemistry, Communicable Diseases and Immunology, Experimental Therapeutics, Medicine, Neuropsychiatry, Pathology, Preventive Medicine, Retrovirology, and Surgery. The support divisions include Headquarters, Resources Management, Logistics, Personnel, Biometrics (Computer and Information Processing), Medical Audio Visual, and Veterinary Medicine.

The scientific and support divisions are located both at the WRAIR Main and the WRAIR Forest Glen. There are 299 permanent professional staff (176 military and 123 civilian) and 498 permanent support staff (199 military and 299 civilian) (WRAIR, 1992). The special field activities component of the WRAIR operates laboratories in Fort Bragg, North Carolina, Thailand, Korea, Brazil, Kenya, and Germany and are staffed by a total of approximately 250 people.

2.3.1 The Division of Communicable Diseases and Immunology

The Division of Communicable Diseases and Immunology conducts research and provides reference and consultative services on the ecology, ecology, pathogenesis, diagnosis, prevention, and treatment of selected diseases of military importance. This division

develops, validates, and applies methods of disease. This work includes studying the modifications induced in host organisms by natural or artificial exposure to living attenuated, or killed disease agents. Studies conducted by the Division of Communicable Diseases and Immunology involve various aspects of health threat assessment, acute rheumatic fever, hepatitis, diarrhea! disease, and acute respiratory disease. The division also provides immunization of trainees. The Division of Communicable Diseases and Immunology develops methods for the production of biologicals and, if necessary, prepares pilot lots for clinical studies (WRAIR, 1992).

The Division of Communicable Diseases and Immunology is composed of nine departments which support various aspects of its mission. These departments include the Department of Bacterial Diseases which studies vaccines against bacterial diseases including gonorrhea and meningococcal group B disease (WRAIR, 1992). The Department of Entomology studies malaria, leishmaniasis, lyme disease and diseases caused by arboviruses. The Department of Immunology is developing a vaccine for malaria The Department of Virus Diseases studies hepatitis (A, B. C, and E) as well as dengue, Japanese encephalitis, and influenza viruses. The Department of Bacterial Immunology conducts vaccine development studies for vaccines against malaria, *Shigella*, and *Salmonella*. This Department also studies the disease and immune mechanisms of *Salmonella* infections. The Department of Biologics Research is working on aspects of the development of a shigellosis vaccine (WRAIR, 1992). The hepatitis laboratory of the Division of Communicable Diseases and Immunology performs clinical testing and is certified by the College of American Pathologists.

The Department of Cellular Immunology is located in leased spaced outside the grounds of the WRAIR Main or WRAIR Forest Glen and is being evaluated in other NEPA documentation (WRAIR, 1992). For additional information regarding activities of the Division of Communicable Diseases and Immunology see Sections 2.4.1.1 through 2.4.1.5, 2.4.1.8, and 2.43.1.

2.3.2 The Division of Neuropsychiatry

The Division of Neuropsychiatry develops and conducts basic research in military psychiatry. This research program investigates the biological, psychological, and social variables which affect behavior under stress, especially combat stress. The Division of Neuropsychiatry evaluates ways of preventing or reducing behavioral and psychiatric dysfunction. Research includes studying the effects of sustained operations and sleep loss on physical and mental performance, developing methods and implementing behavioral and neurological evaluation of medical defense against chemical and biological warfare threats, and investigating the biological effects of radio-frequency electromagnetic radiation and providing the empirical basis for developing pulsed system safety standards. Departments within the Division of Neuropsychiatry include the Department of Military Psychiatry, the Department of Medical Neurosciences, the Department of Behavioral Biology, and the Department of Microwave Research. For additional information regarding the activities of

the Division of Neuropsychiatry see Sections 2.4.1.9, 2.4.2.1, 2 4.2.3, 2.4.3.1, and 2.4.3.2.

2.3.3 The Division of Pathology

The Division of Pathology conducts research elucidating structural and functional alterations in humans and animals resulting from diseases of military importance. Research involves studying the mechanisms of lesion induction and repair in these conditions and the organism's response to diverse natural or experimental injures and stimuli (WRAIR, 1992). The Division of Pathology studies the interrelation of morphologic, immunologic, functional, and biochemical changes which occur in diseases under investigation and uses this information to develop new and improved methods of prevention and treatment (WRAIR, 1992).

In addition, the Division of Pathology is studying the molecular, cellular, and pathobiological mechanisms of illnesses caused by staphylococcal enterotoxin (SE) for the development of vaccines and therapeutics. The Division also develops and evaluates reagents and techniques for diagnosing SE-mediated diseases and hazards. The Division of Pathology also provides the morphologic anatomical parameters for research performed at WRIER as well as collaborates in research activities of other divisions, provides consultation, and assists in experimental pathology as needed (WRAIR, 1992). The WRAIR Department., of Comparative and Ultrastructural Pathology provide approximately 100,000 pathological examinations or tests yearly in support of WRAIR research activities (WRAIR, 1992).

Departments within the Division of Pathology include the Department of Experimental Pathology, the Department of Comparative Pathology, the Department of Ultrastructural Studies, and the Department of Molecular Pathology. For additional details regarding the activities of the Division of Pathology see Sections 2.4.13, 2.4.1.4, and 2.4.1.7.

2.3.4 The Division of Medicine

The Division of Medicine resolves military medical problems in internal medicine through study, laboratory experiments, and consultation. Work within the Division of Medicine involves study of SEB, ricin tome, botulinum toxin and enterotoxigenic *Escherichia coli* The coagulation laboratory of the Division of Medicine performs clinical testing for which it is accredited by the College of American Pathologists (WRAIR, 1992).

Departments within the Division of Medicine include the Department of Nephrology, the Department of Hematology, the Department of Gastroenterology, the Department of Clinical Physiology, and the Department of Respiratory Research For additional information regarding the activities of the Division of Medicine see Sections 2.4.1.2, 2. 4.1 3, 2.4.1 4, 2.4.1.6, 2.4.1.7, 2.4.1.9., 2.4.2.1, and 2.4.2.2.

2.3.5 The Division of Experimental Therapeutics

The Division of Experimental Therapeutics performs basic and applied research in pursuit of new prophylactic or therapeutic drugs or drug regimens for use against medical threats and diseases of military importance. The Division of Experimental Therapeutics is currently developing drugs for use against parasitic diseases including malaria leishmaniasis, and schistosomiasis. In addition, research efforts are directed at developing drugs and drug regimens for use against chemical and biological threat agents including SEB, ricin toxin, and botulinum toxin. Departments within the Division of Experimental Therapeutics include the Department of Parasitology, the Department of Pharmacology, the Department of Biology, the Department of Medicinal Chemistry, and the Department of Chemical Information (WRAIR, 1992). For additional details regarding the activities of the Division of Experimental Therapeutics see Sections 2.4.1.1, 2.4.15, 2.4.1.6, 2.4.1.7, 2.4.1.9, 2.4.1.10, and 2.4.2.1

2.3.6 The Division of Surgery

The Division of Surgery conducts fundamental and clinical research in military medical problems of combat injury, shock, wounding, and resuscitation. The goal of this work is to provide the best possible prevention and therapeutic care for severely injured patients. In addition to this work, the WRAIR Division of Surgery supports the clinical program of the WRAMC and teaching and research programs (WRAIR, 1992).

Departments within the Division of Surgery include the Department of Experimental Surgery, the Department of Combat Trauma Surgery, and the Department of Space Biosciences. For additional information regarding the activities of the Department of Surgery see Section 2.4.2.1.

2.3.7 The Division of Preventive Medicine

The Division of Preventive Medicine provides graduate medical training in preventive medicine and conducts the U.S. Army General Preventive Medicine Residency Program. The Division of Preventive Medicine also conducts graduate medical training in tropical medicine and operates the Epidemiology Consultant Service (EPICON) and the USAMRDC Problem Definition Assessment (PDA) Team (WRAIR, 1992).

The Division of Preventive Medicine assesses the risks associated with infectious diseases of military importance including the prevalence and incidence of Human immunodeficiency Virus (HIV) within the Army. In addition, the Division of Preventive Medicine monitors the incidence of acute respiratory disease at basic training installations, advises WRAIR personnel of health risks and protective measures for overseas travel, and conducts research on certain chronic diseases and other non-infectious conditions of concern to the military. The Division of Preventive Medicine also studies disease threat assessment, acute rheumatic fever, hepatitis B. diarrhea! disease, acute respiratory disease, and the

immunization trainees. trainees Departments the Division of Medicine include the Department of Epidemiology, the Department of Advanced Preventive Medicine, and the Department of Field Studies (WRAIR, 1992). For additional information regarding the activities of the Division of Preventive Medicine see Sections 2.4.1.3 and 2.4.1.6.

2.3.8 The Division of Biochemistry

The Division of Biochemistry provides both basic and applied biochemical research in areas of military medical interest. The Division of Biochemistry studies possible interventions in parasitic, bacterial, and viral disease processes; the role of membranes in disease, diagnosis, and treatment methods of detecting and identifying causes of toxicity or disease; and methods for separating and studying molecules of importance in order to obtain a better understanding of disease, disease process, treatment, or prevention. The Division of Biochemistry develops and conducts research programs in several areas including the biochemical and pharmacological aspects and development of antidotes to toxic agents (biological and chemical) (WRAIR, 1992).

Within the Division of Biochemistry are the Department of Biological Chemistry, the Department of Applied Biochemistry, and the Department of Membrane Biochemistry. For additional information regarding the activities of the Division of Biochemistry see Sections 2.4.1.4 2.4.1.9, and 2.4.1.10.

2.3.9 The Division of Retrovirology

The Division of Retrovirology conducts laboratory and clinical research on HIV and other retroviruses. The Division of Retrovirology is composed of the Department of Diagnostic Retrovirology and the Department of Retroviral Research and is located in Rockville Maryland in space which the WRAIR leases. The mission, activities, and environmental impact of the Division of Retrovirology are being discussed in another NEPA document (WRAIR, 1993).

2.4 Activities

In FY 1991, 88 percent of WRAIR in-house funding was allocated to research efforts countering threats from biologically active substances (naturally occurring infections, 43 percent; HIV, 15 percent; unusual agents and toxins 24 percent; and chemicals, 6 percent). About 7 percent of the 1991 in-house funding was allocated to high-energy and trauma research and approximately 5 percent to research concerning stress and performance (WRAIR, 1992).

2.4.1 Activities Directed Against Threats From Biologically Active Substances

2.4.1.1 Parasitic Diseases

Parasitic diseases are of major military significance and very little commercial, nonmilitary development of anti-parasitic drugs exists. The parasitic diseases currently investigated at the WRAIR are malaria, schistosomiasis, and leishmaniasis. Work involves characterizing both parasitic virulence and host response in order to develop prevention and treatment approaches (WRAIR, 1992). For information regarding the safety practices and procedures required for work with parasites see Sections 2.7.1, 2.7.2, and 2.7.2.1.

Malaria

The Departments of Immunology, Entomology, and Bacterial Diseases (Division of Communicable Diseases and Immunology), and the Department of Membrane Biochemistry (Division of Biochemistry) design and conduct field trials towards the development of a safe and effective malaria vaccine. Malaria, a serious health threat throughout the world, is the result of infection with a protozoan parasite carried and transmitted through the bite of the mosquito. Work by these departments focuses on identifying antigens as well as safe and effective vaccine formulations which will induce antibody formation of sufficient quality and quantity to confer immunity.

The advanced development program involves synthetically or recombinantly produced protein antigens. The in-house production of experimental malaria vaccine for use in clinical testing is scheduled to begin in 1992-1993. This production is scheduled to take place in the WRAIR Forest Glen laboratories being specifically renovated for this purpose (see Section 25) (WRAIR, 1992). Using *Salmonella* and vaccinia, the DoD Malaria Vaccine Development Program is developing a live vector vaccine delivery system in cooperation with industrial partners. WRAIR molecular biologists are working with expression-PCR (E-PCR) which permits the expression of gene products without cloning, thus accelerating the process of characterizing genes and gene products (WRAIR, 1992).

The Division of Experimental Therapeutics develops anti-malarial drugs. This involves synthesizing potential antimalarial drugs, studying the biochemistry and molecular biology of drug resistance in the parasite, and in *vitro* testing of candidate drugs. This division conducts pharmacokinetic, metabolic, and bioavailability studies of candidate drugs which must occur prior to the initiation of clinical research phases (WRAIR, 1992).

Leishmaniasis

The protozoan *Leishmania* (e.g., *L. major* and *L. tropica*) causes leishmaniasis, a group of debilitating and potentially fatal conditions. The protozoan is transmitted by the bite of sand flies. *Leishmania spp* are found in Asia, the Middle East, and several South and Central American countries. Study of the parasite has included study of the molecular

and biochemical basis of antimony resistance and a p-glycoprotein. Clinical studies using WR6026, an investigational new drug, as a treatment for visceral leishmaniasis are being conducted in Kenya (WRAIR, 1992).

Schistosomiasis

Infection with trematodes (flukes) from the genus *Schistosoma* causes schistosomiasis. Schistosomiasis is endemic in Africa, the Middle East, certain West Indies islands, parts of Southeast Asia and South America This parasite infects over 200 million people throughout the world. Acute schistosomiasis is a military threat for which there is currently no treatment.

Work with schistosomiasis is conducted at the WRAIR Forest Glen and involves drug development, diagnostics, quality control of diagnostics, study of immune mechanisms, and monitoring of clinical studies conducted in Egypt and Brazil. Work includes developing *in vitro* models for evaluating potential treatments and the pathophysiology of the disease. *In vitro* testing reduces the need for large numbers of experimental animals, study time, and costs. WRAIR is developing biotelemetric technologies for monitoring portal hypertension associated with schistosomiasis. Safety and tolerance studies of topical anti-penetrant drugs have been conducted and field testing is being conducted in Egypt and then in Brazil.

2.4.1.2 Bacterial Diseases

Soldiers deployed in areas lacking proper sanitary facilities encounter enteric diseases The bacterial pathogens, enterotoxigenic *E. coli* (ETEC) and *Shigella*, cause dysentery and secretory diarrhea, two common intestinal diseases which accounted for 14% of all medical visits during Operation Desert Shield/Desert Storm. The Departments of Biologics Research, Enteric Infections, Bacterial Immunology (Division of Communicable Diseases and Immunology), and the Department of Gastroenterology (Division of Medicine) all study pathogenic E. coin, Salmonella and *Shigella* and the resultant immune response. Additional activities underway involve development of rapid diagnostic methods and vaccines (WRAIR, 1992). For information regarding the safety practices and procedures required when working with etiologic agents such as bacteria see Sections 2.7.1, 2.7.2, and 2.7.2.1.

2.4.1.3 Viral Diseases

The WRAIR Division of Communicable Diseases and Immunology (Departments of Viral Diseases and Biologics Research), the Division of Preventive Medicine (Departments of Field Studies and Advanced Preventive Medicine Studies), the Division of Medicine (Department of Hematology), Division of Retrovirology, and the Division of Pathology conduct work involving viral diseases. These groups conduct research in the various aspects of development and deployment of vaccines, epidemiology, vector control, and biology of naturally occurring viruses of military importance. Studies have involved hepatitis (types A, B. C, and E), dengue, influenza, and Japanese encephalitis. For information regarding the

safety practices required for working with viruses and other etiologic agents see Sections 2.7.1, 2.7.2, and 2.7.2.1.

Hepatitis

In collaboration with two pharmaceutical companies, WRAIR has been developing a vaccine for hepatitis A. This vaccine is expected to be licensed soon by the U.S. Food and Drug Administration (FDA). In January 1991, field efficacy trials of hepatitis A vaccine were conducted in 40,000 children in Thailand. Two studies to evaluate the efficacy of a rapid immunization schedule for the hepatitis A vaccine were conducted in 500 soldiers in Schofield Barracks, Hawaii and in 550 soldiers at Fort Lewis, Washington. Additional studies in the administration of vaccine by Jet gun (as opposed to needle administration) and in conjunction with the hepatitis B vaccine were conducted at Fort Campbell, Kentucky (WRAIR, 1992).

The hepatitis C virus is the principal cause of parenterally transmitted non-A, non-B hepatitis the outcome of which may be chronic hepatitis leading to liver cirrhosis or carcinoma The WRAIR has been studying the epidemiology of hepatitis C and development of a survey and hepatitis C registry are underway and includes data from stored samples. Work towards the production of a hepatitis C vaccine involves attempts to cultivate the virus in order to develop an inactive live or attenuated virus (WRAIR, 1992).

Work involving the hepatitis E virus includes evaluation of the extent of the military threat of this viral disease to U.S. forces through epidemiologic investigations, development of diagnostic tests, and study of hepatitis E infection in the *Cynomolgus* monkey (WRAIR, 1992).

Dengue

The WRAIR also studies dengue fever and dengue hemorrhagic fever. These mosquito-borne viral diseases are of military concern because of their prevalence in tropical and subtropical regions of the world. The epidemiology of dengue hemorrhagic fever and mosquito control strategies are under investigation in Thailand. The ultrastructure of liver cells damaged by this virus is being studied using electron microscopy. The mode of viral replication and dispersed through the body is under investigation using both *in vitro* and in of (monkeys) experiments (WRAIR, 1992).

Prevention of dengue is anticipated through vaccine administration. Dengue virus vaccines, including a recombinant vaccine, are under development. Dengue genes have been expressed in a number of systems, including *E. coli*, baculovirus, and yeast Recombinant proteins expressed by baculovirus have been successful in protecting mice against dengue virus. A synthetically produced peptide has stimulated neutralizing-antibodies in rabbits. Twenty-one candidate vaccines have been produced, six tested, and several of these are to undergo further testing (WRAIR, 1992).

Japanese Encephalitis

Scientists at the WRAIR are also developing a licensed vaccine for Japanese encephalitis for the routine immunization of all soldiers deployed to Asia The outbreak of virulent strains of influenza continues to be of military concern.

Other Viral Diseases

WRAIR activities monitor the effectiveness of influenza vaccines and determine the emergence of other acute respiratory diseases in military personnel. Natural disease threats of specific concern within the Middle East have been investigated (WRAIR, 1992).

2.4.1.4 Vaccine Technology

The WRAIR Division of Biochemistry (Departments of Membrane Biochemistry and Biological Chemistry), Division of Retrovirology, Division of Communicable Diseases and Immunology (Departments of Biologics Research, Immunology, and Bacterial Diseases), Division of Pathology, and Division of Medicine research and develop vaccine formulation technologies. The development of new or improved vaccines for naturally occurring infections or threat agents is in part accomplished through collaborative technology transfer agreements between the WRAIR, private industry, and other government agencies (WRAIR, 1992). These activities involve identifying and improving ways to produce, deliver, and confer immunity with vaccines. Vaccine formulation technologies for malaria sporozoite vaccines have been developed, manufactured, and tested in animals and in human volunteers. Preclinical testing of vaccines against diarrhea (enterotoxigenic *E. coli*) and SEB toxin have been undertaken in primates (WRAIR, 1992).

WRAIR develops many different vaccines and biological products that are intended for human clinical testing. Candidate products begin as research ideas and are subsequently advanced through investigation to the development and production stage. Vaccine production requires the use of carefully controlled conditions (see Section 2.5). Biological products intended for human use must be manufactured and tested in accordance with the guidelines established by the FDA. Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) regulations must be followed to ensure safe, pure, and effective products. Laboratory space at the WRAIR Forest Glen has been renovated for these vaccine production efforts (see Section 2.5). These production activities will require Biosafety Level-3 (BSL-3) containment and practices (Appendix C). The WRAIR has been using contracted facilities for this level of vaccine production.

2.4.1.5 Arthropod Vectors

Arthropod vectors are mosquitoes sand flies or other insects capable of carrying disease producing agents from one host to another. The WRAIR Division of Communicable Diseases and Immunology (Department of Entomology) studies the arthropod vectors

responsible for the transmission of malaria, dengue, rickettsial diseases, leishmaniasis, and lyme disease. Work entails developing tests for the detection and identification of parasites, identifying arthropod vectors, and educating military personnel deployed in endemic areas. Work also elucidates the host-parasite-vector relationships, environmental factors influencing vectors and disease transmission, effects of anti-malarial drugs, mechanisms and actions of vector repellents, and vector-host models for vaccine development (WRAIR, 1992). For information regarding WRAIR practices for safely working with arthropod vectors see Section 2.7? 2.

2.4.1.6 Disease Threat Assessment

The WRAIR Division of Preventive Medicine, Division of Communicable Diseases and Immunology, Division of Experimental Therapeutics, and Division of Medicine provide information to medical planners regarding disease threat assessment Epidemiologic data obtained from troop surveys, medical treatment facilities, and population disease incidence are used to estimate the nature and probability of disease threats to deployed forces (WRAIR, 1992).

2.4.1.7 Biological Toxins

Biological tomes are chemicals produced by organisms such as bacteria, plants, or animals. Extremely small doses of toxins may greatly impact the functioning of metabolic processes in a susceptible host, resulting in severe illness or death. Under the auspices of the BDRP, WRAIR investigates medical countermeasures against SEB (a toxin produced by *Staphylococcus aureus*), botulinum toxin, and ricin toxin (WRAIR, 1992). WRAIR units involved include the Division of Pathology, Division of Medicine, and Division of Experimental Therapeutics (Department of Biology).

Research studies with botulinum and ricin involve the biological mechanisms and effects of these toxins at the cellular level and development of *in vitro* and *in vivo* (mouse) models for screening drugs for possible protection or treatment. Studies with SEB involve understanding toxin mode of action and immunobiology, developing and improving vaccine against SEB, developing effective therapies for use against SEB intoxication, and developing rapid diagnostic methods. SEB studies use *Rhesus* monkeys, mice, and cell cultures (WRAIR, 1992). For information regarding safety practices and procedures required for work with biological toxins see Section 2.7.23.

2.4.1.8 Biological Agents

The Department of Cellular Immunology and the Department of Bacterial Diseases (Division of Communicable Diseases and Immunology) research currently involves developing strategies for nonspecific protection against aerosol exposure to biological agents such as *Francisella tularensis*. The Department of Bacterial Diseases is studying ways to provide immediate immune protection to an exposed individual until a definitive diagnosis

has been made and specific therapy initiated Activities of the Department of Bacterial Diseases include study of the immunology of Francisella in mice, characterization of live vaccine strain Interaction with white blood cells, development of subunit vaccines, and preparation of monoclonal antibodies to potential biological warfare threats (WRAIR, 1992). The portion of this work requiring BSL-3 containment is conducted at the Department of Cellular Immunology located in leased space in Rockville, Maryland (Records of Environmental Consideration, WRAIR; Tyner, 1991). For additional information about BSL-3 containment see Appendix C The activities and facilities of the Department of Cellular Immunology are being evaluated in other documentation (WRAIR, 1993).

2.4.1.9 Physiologically Active Compounds

Physiologically Active Compounds (PACs) are molecules normally found in living organisms which when delivered in large quantities or in abnormal forms can incapacitate or kill. The WRAIR Division of Neuropsychiatry (Department of Medical Neurosciences), the Division of Biochemistry (Department of Applied Biochemistry), and the Division of Medicine (Department of Clinical Physiology) assess and develop protective measures against PACs which might be used as weapons (WRAIR, 1992). Activities involve study of the effects of PACs on the brain and spinal cord using both *in vivo* (rat) and neuronal culture techniques; study of PAC receptor sites in rats; effects of PACs on cognition, behavior, and performance by use of animals models, and basic research for generic defenses against classes of PACs (WRAIR, 1992).

2.4.1.10 Chemical Defense

The Division of Biochemistry, Division of Experimental Therapeutics, Division of Medicine, and Division of Neuropsychiatry are involved in defense against chemical agents. The chemical agents of concern are cyanide, vesicants (blister forming agents), the anticholinergic nerve agents tabun (GA), sarin (GB), soman (GD), VX, and carbamates. Study within this area also involves development of assessment models for determining the impact of stressors and pharmacological agents on human performance. Chemical warfare agents are not used at the WRAIR facilities (Tyner, 1991). Instead, common solvents, chemicals of low toxicity, computer modeling, or the substitution of low hazard drugs with physiologically related effects are used (Records of Environmental Consideration, WRAIR)

Countermeasures against cyanide toxicity entail both and in studies to develop drugs that can induce the formation of methemoglobin (a preventive measure against cyanide toxicity) and study of the effects of methemoglobin on performance (sheep). Countermeasures against vesicants involve potential treatment and pretreatment drugs against sulfur mustard (HD) are also studied. Also, an In vitro system to test the efficacy of ant/dotes to nitrogen mustard, has been developed which will be used as a model for testing candidate HD antidotes.

Research towards developing therapeutic and diagnostic countermeasures against anticholinergic agents is also conducted. Basic research focuses on understanding the use of enzymes (cholinesterase and carboxylesterases) as treatments and the use of computer modeling for finding molecules (followed by *in vivo* testing) with a high probability for blocking nerve agent binding to target cells.

2.4.2 Activities Directed Against Threats From High Energy and Trauma

2.4.2.1 Trauma Combat and Casualty Care

The WRAIR trauma casualty basic science research program activities focus on central nervous system injury and the role of immune function and activated neutrophilis in combat casualty care (WRAIR 1992). The WRAIR clinical research program activities focus on immunization against bacterial sepsis and bacterial endotoxins.

The WRAIR Department of Medical Neurosciences (Division of Neuropsychiatry) develops *in vitro* and *in vivo* (rats) models of central nervous system (CNS) injury. These studies examine the biochemical mechanisms of the pathophysiological impacts of CNS injury. Pharmacological treatments for CNS injuries are also developed and tested. Using *in vitro* and *in vivo* (rabbits) models, investigators in the Department of Hematology (Division of Medicine) study the mechanisms of disseminated intravascular coagulation (DIC). Studies also examine the basic cellular physiology of neutrophil activation, adhesion, and aggregation resulting from trauma, shock, or burns and means for preventing neutrophil mediated injury (WRAIR, 1992).

The WRAIR Division of Surgery develops animal models for studying immune mechanisms resulting from major trauma and blood volume replacement techniques for use in cases of hemorrhage. The Department of Bacterial Diseases uses mice in the study of treatments for *Pseudomonas* wound infection and sepsis. In a study examining means of preventing infection, human donors were immunized with both *Klebsiella* and *Pseudomonas* vaccines. Plasma (containing antibodies for these bacterial organisms) obtained from the human donors was processed into an immunoglobulin for intravenous use (IVIG). A follow up study, in collaboration with the Veterans Administration Cooperative Studies Program, will examine the long term efficacy of this preparation in preventing infection (WRAIR, 1992).

Thirty-three volunteers received a vaccine for preventing invasive *E. coli* infections. Following encouraging data on tolerance and antibody response, an additional 60 volunteers received this immunization. The plasma from these 60 volunteers is being made into a pilot lot of immunoglobulin which will be evaluated for effectiveness in an animal model. Other studies examining treatments and preventive therapies for septic shock are ongoing, including preclinical and clinical immunotherapeutic treatments and a Phase I study of a vaccine against endotoxic shock (WRAIR, 1992).

2.4.2.2 Blast Overpressure and Toxic Gases

The WRAIR Department of Respiratory Research (Division of Medicine) investigates the effects of blast overpressure (BOP) and inhaled toxins. The Department of Respiratory Research also assesses health hazards and combat casualty issues associated with BOP and tome gases. The Department of Respiratory Research is developing animal models (sheep) for experiments performed at- rest and with exercise, and anesthesia and analgesia treatments. The Department of Respiratory Research also studies the cardiopulmonary effects and mechanisms of injury resulting from BOP and inhaled toxicants (WRAIR, 1992)

The WRAIR Department of Respiratory Research is the lead agency for study of combat casualty effects for the Army's live fire test program and other combat operational testing. Research regarding health hazards and combat casualties includes development of health hazard assessment threshold limits, predictive criteria for combat casualties, improved triage efforts, and pre-exposure and post-exposure treatments. These efforts are used for the development of Health Hazard Assessment reports for new weapons. The pathophysiology of nitrogen dioxide and the effects and significance of carbon monoxide toxicity are the focus Of toxic gas research. Computer-controlled measuring devices are being developed by the cardiopulmonary Bioengineering Section for evaluating respiratory responses in experimental anneals (WRAIR, 1992).

2.4.2.3 Microwaves

As part of the Radiofrequency Directed Energy (RFDE) program, the WRAIR Department of Microwave Research (Division of Neuropsychiatry) studies the biological effects and hazards of electromagnetic radiation (microwaves) especially with regard to military applications. Work includes study of effects on living whole animals (rabbits, rats, mice, and monkeys) and genetic or cellular effects using cell cultures (WRAIR, 1992). For information regarding safety practices in the use of microwaves see Section 2.7.25.

2.4.3 Activities Directed Against Threats From Stress and Performance

2.4.3.1 Continuous and Sustained Operations

The WRAIR Division of Neuropsychiatry (Departments of Behavioral Biology and Medical Neurosciences) studies means of sustaining and enhancing soldier performance during continuous operations. Research efforts also include investigation of the neurobiology of performance degradation and recovery as a function of sleep (WRAIR, 1992).

Field studies were conducted during Operations Desert Shield and Desert Storm through use of "wear and forget" wrist-worn microprocessor-based sleep/activity monitors. L laboratory work includes administration of sleep inducing or stimulant drugs to normal

human volunteers to determine their safety and efficacy. Computer modeling is used to assess combat unit performance during continuous operations. Laboratory studies in humans and animals focus on elucidating the human neurobiological issues of how prolonged waking impairs mental performance and sleep restores it. Laboratory investigations human volunteers examine brain energy metabolism and brain neurotransmitters (WRAIR, 1992).

2.4.3 Combat Psychiatry

The WRAIR Division of Neuropsychiatry investigates physiological correlations in both the central nervous and endocrine systems, emotional and psychological effects of extreme stress, and the effects of social variables (leadership and interpersonal relationships) in small military units The role of regulatory molecules in stress responses is being examined in rodents, and combat exhaustion is being studied through the use of animal models. Recent studies examined the effects of stress on immune response and the effects of family and community on soldier coping. Studies include data obtained during two combat operations; Operation Just Cause (Panama) and Operation Desert Shield/Desert Storm (WRAIR, 1992).

2.5 Biosafety Levels

The Centers for Disease Control (CDC) and the National Institutes of Health (NIH) have established four biosafety levels to be used when conducting laboratory operations with infectious agents and their toxins. These BSLs are described in CDC/NIH Biosafety in Microbiological and Biomedical Laboratories (CDC/NIH, 1988). The CDC/NIH Guidelines identify the minimum combinations of laboratory techniques, safety equipment, and laboratory facilities necessary to control and contain the potential hazards associated with the research use of etiologic agents. The CDC/NIH Guidelines were developed on the basis of prior laboratory experience, disease transmissibility, agent pathogenicity, and vaccine availability After evaluating these characteristics for a large group of organisms, the CDC and the Subcommittee on Arbovirus Laboratory Safety (SALS) of the American Society of Tropical Medicine and Hygiene determined BSL classifications for all potentially infectious and/or disease-causing microorganisms (CDC/NIH, 1988).

BSL-1 practices, safety equipment, and facilities are appropriate for facilities in which work is done with defined and characterized strains of viable microorganisms not known to cause disease in healthy adult humans. BSL-2 containment is appropriate for facilities performing work with the broad spectrum of indigenous moderate-risk agents present in the community and associated with human disease of varying severity. Work with indigenous or exotic agents where the potential for infection by aerosols is real and the disease may have serious or lethal consequences requires BSL-3 containment. BSL-4 practices, safety equipment, and facilities are applicable for work with dangerous and exotic agents which pose a high individual risk of life-threatening disease.

The highest level of containment currently required at WRAIR Main or WRAIR Forest Glen is BSL-2. However, space within Budding 501 (WRAIR Forest Glen) is being renovated and space within Building 508 Forest Glen) has been renovated to standards of containment. Laboratory work planned for these locations will involve the preparation of research size batches of candidate vaccines for use in clinical trials (see Section 2.4.1.4) (Tyner, 1991) The only other BSL-3 space currency in use is in the WRAIR Leased Facilities located in Rockville, Maryland (WRAIR, 1993). For a description of the characteristics of a BSL-3 laboratory *see* Appendix C

The activities at WRAIR involving HIV or toxins require BSL-2 standards, procedures, and safety/containment Standards and specific practices, containment equip- meet, and facilities used for laboratory activities with HIV are dependent upon the concentration of virus or *type of* laboratory procedures used. BSL-2 standards are recommended by the CDC/NIH Guidelines for work using body fluids, clinical specimens, and tissues from infected or inoculated laboratory animals. Based on these criteria, the use of BSL-2 practices are required when handling HIV material. Only high concentrations or industrial-scale production of HIV require BSL-3 practices and facilities (CDC/NIH, 1988).

2.6 Security

All buildings are open during daytime hours with the exception of Building 502, the microwave facility, which limits access 24 hours-per-day Signs are posted within each facility to indicate restricted areas. WRAMC provides security patrols which monitor buildings at night. The gates to the WRAMC installation are locked and manned at night. Building 502, located at the WRAIR Forest Glen, requires escorts for visitors and uses closed-circuit television cameras to monitor the premises.

2.7 Safety

2.7.1 The WRAIR Safety Program

All activities of a hazardous nature performed by either civilian or military personnel at work sites Within WRAIR are governed by the WRAIR Safety Program The WRAIR Safety Program, which seeks to provide workplace safety and health for employees and visitors and protection of the environment, is detailed m WRAIR Regulation 385-10 (WRAIR Safety Regulations This program implements all applicable federal, state, local, DoD, Headquarters DA, and USAMRDC requirements, policies, end practices. Compliance with WRAIR Regulation 385-10 is mandatory for all civilian and military personnel. WRAIR Regulation 385-10 describes safety management and responsibilities, personnel training, personal protective equipment and clothing, waste handling procedures, inspections, spill and emergency procedures, hazard communication, and numerous other elements impacting on safety. The WRAIR Safety Program is managed in accordance with AR 38510 (The Army Safety Program) and AR 385-69 (The Army Biological Defense Safety Program). The organizational structure of the WRAIR Safety Program is shown in Figure 2-3.

Written procedures must be prepared for all laboratory work involving potentially hazardous operations. Such operations include work with infectious or toxic materials, hazardous chemicals, or radioisotopes. Protocols for laboratory work are filed with the WRAIR Safety Officer and are available from laboratory supervisors or a project's Principal Investigator (PI). For information regarding safety practices and procedures see Sections 2.7.2.1 (etiologic agents), 2.7.2.2 (biological vectors), 2.7.23 (biological toxins), 2.7.2.4 (radioisotopes), 2.7.2.5 (microwaves), 2.7.2.6 (hazardous chemicals), and 2.7.2.7 (recombinant DNA).

The WRAIR must comply with guidelines for the design, construction, and maintenance of safe laboratory facilities. These guidelines include the codes and standards of the National Fire Protection Association (NFPA), the Occupational Safety and Health Association (OSHA), the National Electrical Code (NEC), and the Environmental Protection Agency (EPA). Additional requirements are found in DoD Instruction 6055.1 (DoD Occupational Safety and Health Program), AR 385-10, AR 420-90 (Fire Prevention and Protection), and WRAIR Regulation 385-10 (Chapters 4 and 5). For information regarding the current status of WRAIR facilities see Sections 2.85.1 and 2.85.2.

2.7.2 Safety in the Use of Biologically Active Substances

2.7.2.1 Etiologic Agents

Etiologic agents are the microbial or viral agents of an infectious disease. Work with these agents is conducted according to CDC/NIH Guidelines (CDC/NIH, 1988). These federal guidelines for biosafety in microbiological and biomedical laboratories are described in *Biosafety in Microbiological and Biomedical Laboratories*, Centers for Disease Control and National Institutes of Health, 1988, DHHS Publication Number 88-8395 (CDC/NIH, 1988). These guidelines describe recommended levels of laboratory practices and techniques, facilities, and equipment necessary to contain infectious organisms and their products of varying degrees of pathogenicity and virulence to minimize risks to human health and the environment. Federal guidelines for laboratory work involving the testing of biological products are described in the FDA Regulations for GLP (21 Part 58) and for the production of biological products in Current Good Manufacturing Practices for Human and Veterinary Drugs (21 CFR Parts 210, 211, and 225).

Before work involving the use of infectious or hazardous biological material may take place, procedures must be carefully reviewed and approved by the WRAIR Safety Advisory Committee and the WRAIR Safety Officer in accordance with WRAIR Regulation 385-10. Research protocols must be evaluated for their potential environmental impact in accordance with AR 200-2 and for their compliance with safety regulations specified in AR 385-10, AR 385-69, and DA Pamphlet 3859. Work with infectious material or other biological hazards must be conducted in laboratories which provide the appropriate level of containment relative to the risk (see Section 2.5).

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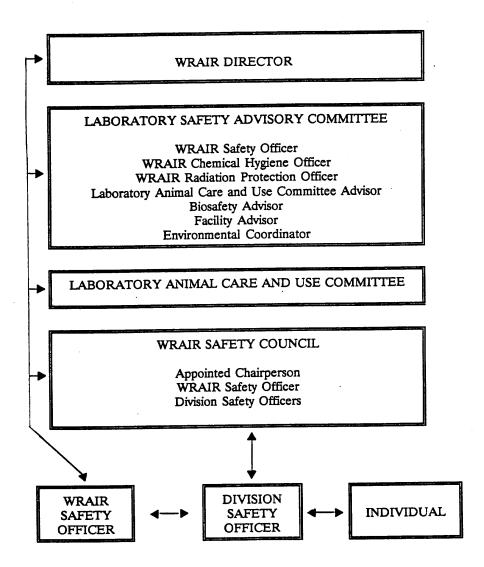


Figure 2-3 WRAIR Safety Structure Organization

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CDC/NIH Guidelines describe the combinations of laboratory practices and protocols, facilities, safety equipment, and engineering (i.e., (i.e., required for various etiologic agents (CDC/NIH, 1988). Recommendations for BSLs for particular infectious agents are determined based on the potential hazard associated with activities involving that organism (see Section 25). The WRAIR Main and WRAIR Forest Glen maintain laboratories classified as BSL-1/BSL-2. Activities requiring BSL-3 containment are planned for WRAIR Forest Glen (see Section 25).

Storage and Handling of Etiologic Agents

Material containing etiologic agents must be handled with the appropriate degree of containment as recommended by CDC/NIH Guidelines (CDC/NIH, 1988). WRAIR Regulation 385-10 also details uniform policies and procedures for the storage, handling, and disposal of etiologic agents. The WRAIR Safety Officer, in conjunction with the safety officer for each division, must ensure that all infectious material within WRAIR is properly handled, labeled, and stored. The WRAIR Safety Officer and Division Safety Officers also must ensure that all individuals are appropriately trained in the handling, storage, and disposal of infectious materials (see Section 2.7.6). The WRAIR Laboratory Safety Advisory Committee must approve all research protocols involving the use of bacterial, fungal, viral, rickettsial cells, or particles that may cause disease. The WRAIR Laboratory Safety Advisory Committee must also submit recommendations regarding the biosafety and procedures of the research project. WRAIR Regulation 385-10 and the written procedures maintained for each laboratory detail procedures for the safe handling and use of infectious materials.

Laboratories using infectious materials requiring special provisions such as vaccination or medical monitoring of personnel must display the international biohazard sign on all access doors. This sign must identify the infectious agent or agents in use, the names and telephone numbers of responsible individuals, and information regarding the special provisions required (WRAIR Regulation 385-10).

All infectious and potentially infectious materials must be sealed and properly labeled in accordance with WRAIR Regulation 385-10. Infectious and potentially infectious materials must be stored separately from non-infectious materials in designated areas. Refrigerators, freezers, and cabinets which are used for storing infectious or potentially infectious materials must be locked, labeled with the international biohazard sign, infectious agent names, and a 24-hour telephone number for the point of contact.

Movement of infectious materials within a building and on post must be in accordance with WRAIR Regulation 385-10. Materials must be placed within sealed, watertight containers (primary container). The surface of the primary container must be disinfected by wiping with an appropriate disinfectant (e.g., one percent sodium hypochlorite) and placed within a second, durable, watertight container (secondary containment). The secondary container must be labeled with the international biohazard

symbol, name of the infectious agent, and a point of contact. WRAIR 385-10 details additional procedures for the packaging and transport of infectious materials. Shipment of etiologic agents must be in accordance with WRAIR Regulation 385-10 and requirements of 42 CFR 72 (Etiologic Agents-Shipment of Certain Things).

Equipment and Maintenance Required in Use of Etiologic Agents

Biological safety cabinets must be used when working with infectious materials categorized as BSL-2 or greater Biological safety cabinets must also be used when the nature of a procedure may pose an inhalation (aerosol) hazard. In accordance with CDC/NIH Guidelines (CDC/NIH, 1988) and WRAIR Regulation 385-10, Biological Safety Cabinets must be inspected and certified annually. Presently this is conducted by a contractor under WRAMC Medical Maintenance. WRAMC Medical Maintenance must annually inspect and certify biological safety cabinets. Cabinets must also be inspected when installed or relocated on the premises. WRAIR Regulation 385-10 details additional safety regulations for the use of Biological Safety Cabinets and BSL requirements. Used cabinet filters must be decontaminated with formaldehyde vapors prior to removal from cabinets. Once removed, filters must be disposed of as hazardous waste (see Section 2.73.4) (Mueck, 1992). Final exhaust from laboratories must be discharged through stacks elevated above e roof of the budding.

Autoclaves (steam sterilizers) must be readily available in laboratory areas using BSL - biocontainment and safety practices. Rodent and pest control practices are m place for all WRAIR laboratories. The WRAMC Directorate of Engineering and Housing (DEH), Pest Management Branch, is responsible for pest control and maintains all required documentation (Spencer, 1992).

In addition to the practices required of BSL-2 laboratories, BSL-3 laboratories must maintain air ventilation systems that draw air into the laboratory from entrances and exhaust laboratory air out of the building away from occupied areas and building air intake vents (negative air pressure). Air discharged from BSL-3 laboratories is not recirculated anywhere within the building Prior to discharge, exhaust air from biological safety cabinets must pass through high efficiency particulate air (HEPA) filters which remove 99.97% of the particulate matter greater than or equal to 03 micrometers. For additional information regarding equipment and maintenance required for laboratories using etiologic agents see Appendix C

Procedures for Working With Parasites

Special safety practices are used when working with parasites at the WRAIR. Infective stages of parasites may be present in blood, feces lesions, or arthropod vectors and provide a risk to the worker. As recommended by the CDC/NIH Guidelines (CDC/NIH, 1988), BSL-2 practices and containment must be employed during work with infective stages of protozoan parasites Skin contact is avoided by wearing gloves. Sharps (syringes, needles,

glass slides, razor blades, Pasteur pipettes, and broken glass) and other potentially infectious materials must be handled and disposed of in accordance with WRAIR Regulation 385-10.

Leishmaniasis is exemplary of the BSL-2 infectious agents that are or may be utilized at the WRAIR. Infections may result from accidental injection (parenteral inoculation) or ingestion of contaminated material or through contact with an arthropod vector. Immature stages of *Leishmania spp.* are also potential infection hazards if present in aerosols or droplets. Laboratory acquired leishmaniasis could occur if a worker becomes inoculated with a sufficient amount of parasite. In order to confer disease, however, the parasite must be in a specific stage of its development and must have developed within the sand By vector. The laboratory animals used in the study of leishmaniasis are selected because of their extreme sensitivity to the parasite. Such experimental animals essentially have no immune system response to the parasite.

Leishmania in culture undergo a stationary phase which closely resembles the infective stage of the parasite life cycle in sand flies. A worker infected with large numbers of the organism at this stage of development may become ill. Serum samples are obtained for all new laboratory employees in order to have a history of antibody titer for use in the event that the worker is accidentally inoculated with parasite. In the event of an accident, serum samples would be again tested to determine the extent of the immune response. Effective drug therapies are available for the treatment of leishmaniasis.

Experimental animals are another source of potential parasitic infection for- the laboratory worker. Infection is possible if a worker handles an experimental animal without the proper personnel protective equipment (e.g., gloves) and is exposed, through an open skin lesion, to the parasite infecting the animal. Potentially infected experimental animals are handled in accordance with WRAIR Regulation 385-10. Historically, those working around the parasite over an extended period of time will develop an increase in antibody titer, however, these increases are not of the magnitude indicative of the disease process. No cases of laboratory-acquired Leishmania infections have been reported.

Infective stages of schistosomes are also handled according to the recommendations of the CDC/NIH Guidelines (CDC/NIH, 1988) which include the use of BSL-2 containment and practices. Skin contact with infective stages of schistosomes is avoided. Gloves, rubber over sleeves, rubber aprons, and face masks are used for work with parasites or water containing infective snail hosts. All personnel working with the parasite have monthly stool examinations and antigen testing is conducted if infection is suspected. A treatment protocol is in place and would be started in the event that a worker were infected. No worker has ever been infected since the inception of the program in the early 1960's. Methanol kills the parasite on contact and is kept in squeeze bottles for surface treatment of skin in the event that some potentially infective fluids should come into contact with the skin. Outside of the snail, the parasite can live for only a few hours.

Requirements for Working with Diagnostic Specimens

Diagnostic laboratory specimens (e.g., serum and plasma samples) are not routinely handled in safety cabinets. This procedure is the accepted practice according to CDC/NIH Guidelines (CDC/NIH,, 1988). The handling of these specimens is conducted in accordance with standard microbiological laboratory technique and follows the safety equipment and practices of BSL-2. Preparation and analysis of microbiological plates and tubes is in accordance with standard microbiological methods and CDC/NIH Guidelines (CDC/NIH, 1988).-

2.7.2.2 Biological Vectors

Biological vectors are organisms which carry disease-producing agents from one host to another. For most parasites, growth and differentiation within a specific vector are essential at various stages in the parasite's life-cycle. The hosts in which a parasite can survive to reproduce are generally very specific. The biological vectors used in WRAIR research activities are arthropods and mollusks. Vectors are maintained at the WRAIR for use in the study of the diagnosis, treatment, and prevention of disease (see Section 2.4.1.1 and 2.4.1.5

Arthropod vectors, mosquitoes and sand flies, are used in the study of malaria and leishmania, respectively. Mosquitoes are vectors of malaria and sand Dies are vectors of leishmaniasis. The mosquitoes and sand flies are maintained within secure facilities to prevent their escape and the accidental exposure of personnel. Containment is maintained by the use of incubators and double-screened rooms.

Snails, the molluscan vectors used at the WRAIR, are vectors of schistosomiasis. As vectors of schistosomiasis, infected snails are kept separate from non-infected snails. Infected snails are secured and maintained within locked cabinets. Gloves, rubber over sleeves, rubber aprons, and face masks are worn when working with water containing snails which are potentially infected with schistosomes. Methanol is used for immediate surface treatment of skin in the event of contact with potentially infective fluids. Prior to discharge into the sanitary sewer the aquaria water in which snails are kept is treated with bleach and methanol to kill any potentially infectious *Schistosomes* which may be present

2.7.2.3 Biological Toxins

Biological toxins are chemicals produced by organisms such as bacteria, plants, or animals which are capable of causing extreme illness or death when delivered at even very small doses. Studies of the basic mechanisms of toxins at the cellular level may provide the knowledge necessary to develop rapid diagnosis and treatment' or protection against toxin exposures. The biological toxins studied at the WRAIR are SEB, botulinum, and ricin (see Section 2.4.1.7). Safety requirements for work with tomes are described in the AR 385-69, Biological Defense Safety Program (32 CFR 626), DA Pamphlet 385-69 Biological Defense

Safety Program - Technical Safety Requirements (32 CFR 627), AR 70-65, Controlled Hazardous Biological Substances (Chapter 3), and WRAIR Regulation 385-10. BSL-2 practices, containment equipment, and facilities as detailed in the CDC/NIH Guidelines (CDC/NIH, 1988) must be used for work with toxins Additional precautions such as those recommended in the CDC/NIH Guidelines for work in BSL-3 laboratories are used for work having a high probability for generating the formation of aerosols or droplets, or if high concentrations of toxins are used (CDC/NIH, 1988). For information regarding the characteristics of BSL-2 and BSL-3 laboratories see Appendix C.

2.7.2A Radioisotopes

Certain WRAIR activities utilize radioactive isotopes (radioisotopes) to detect and measure specific molecules (e.g., enzymes, antibodies) present in extremely small amounts in solutions, cells, tissues, or organisms. Radioisotopes are elements (such as carbon, hydrogen) which are slightly unstable and in the process of their breakdown give off detectable energetic particles. All operations requiring the use of radioisotopes must be conducted according to written procedures which meet or exceed Nuclear Regulatory Commission (NRC) standards. The NRC, Army (AR 385-10, AR 385-11), WRAMC regulations (WRAMC 40-10, WRAMC 385-11), and WRAIR Regulation 385-10 regulate the use and handling of radioactive material and wastes. These safety requirements encompass the use, storage, inventory, and receipt of radioactive materials. They also detail the personal protective clothing required when working with radioactive materials.

The regulations of the NRC, Army, WRAMC, and WRAIR require that the Health Physics Office (WRAMC) authorize laboratory operations involving radioactive material. The WRAMC Health Physics Office assures that the handling, use, and disposal of radioactive materials comply with the requirements of all applicable federal, state, and Army regulations and directives. The WRAMC holds the "License of Broad Scope for Byproduct Material" from the Nuclear Regulatory Commission (NRC) under which all of WRAIR laboratories operate. Radionuclides in use at the WRAIR are H-3 (tritium), C-14, P-32, S-35, Ca-45 Cr-51, I-125. Radioactive material use, handling, and disposal at the WRAIR must be in accordance with WRAMC Regulation 40-10 (Medical Services, Health Physics), federal regulations, and State of Maryland radiation regulations (COMAR 26.12.01 and 26.12.02). Storage of radioactive materials at designated storage areas must be in accordance with 10 CFR 21 (Regulations for Standards for Protection Against Radiation). For information regarding the disposal of radioactive wastes see Section 2.735.

The use or storage of food, drinks, cosmetics, or tobacco is not permitted in any area or room where radioactive materials are present. All radioactive material must be secured in locked cabinets or refrigerators when not in use. All storage areas must be marked with the universal radiation symbol, and the specific areas within each laboratory where radioactive materials are used must also be clearly identified.

Personnel working with radioisotopes must use the appropriate personnel protective equipment. This equipment must be removed before leaving a work area Hand washing is required prior leaving the work area, eating, or applying cosmetics. The Health Physics Office determines potential radiation exposures requiring the issue of personal monitoring devices which have been listed in WRAIR Regulation 385-10. All areas using radioisotopes must be surveyed daily with an appropriate survey meter and decontaminated as necessary. Areas using tritium are surveyed using a wipe test with sensitivity to detect 100 disintegrations per minute/100 square centimeters.

Compliance with NRC, Army, WRAMC, and WRAIR regulations requires records of receipt, use, personal monitoring, laboratory surveys, and disposal of radioactive materials. These records must be completed as required and are maintained by the WRAMC Health Physics Office.

2.7.2.5 Microwaves

Waves within the electromagnetic spectrum vary, according to wavelength and frequency, from radio waves, microwaves, and visible light to gamma rays. The WRAIR conducts research-to determine the biological effects of microwave exposure, including the determination of permissible limits of exposure (see Section 2.4.23).

In accordance with WRAIR Regulation 385-10 and WRAMC Regulation 40-10, the WRAMC Health Physics Office must maintain an inventory of all microwave ovens, high intensity optical sources, lasers, radio-frequency sources, and ultrasound devices. Information maintained includes the type of device, its manufacturer, model and serial numbers, Maintenance Management Control Numbers, and the location of the equipment. The Health Physics Office must be notified when the equipment is moved or turned in for maintenance or disposal. All personnel working with or in the vicinity of non-ionizing radiation must be informed of the potential hazards associated with the equipment. Approved procedures for the operation of sources of non-ionizing radiation are posted at the site of operation and are also kept on file at the WRAMC Health Physics Office enforces adherence to these procedures through monthly visual inspections of all sources of non-ionizing radiation. Microwave use and resulting radiation must comply with OSHA requirements set forth in 29 CFR 1910.97.

Only designated and specially trained individuals may operate the microwave transmitter sources in Building 502. An internal certification process for these individuals is in place. Safety chains are used during microwave transmission to control access to the **exclusion** and control area Safety locks, which prevent accidental entrance into operating chambers, are in place in chamber doors. Written procedures provide detailed instructions for systems inspections, configuration, transmitter power-up and shut-down, and maintenance.

2.7 2.6 Hazardous Chemicals

The policies and procedures of WRAIR Regulation 385-10 (Chapter 9, Chemical Safety) and the WRAIR Chemical Hygiene Plan (CHP) govern all WRAIR operations involving the use, handling, storage, and disposal of chemicals, hazardous materials, and hazardous waste. The WRAIR CHP defines and details responsibilities, policies, and procedures for all aspects of handling hazardous chemicals in the laboratory. The CHP is applicable to all WRAIR laboratories and workers. The WRAIR operations must be in compliance with federal hazardous waste regulations (40 CFR 260-266), hazardous waste laws of the State of Maryland (COMAR 26.13.01-10), Department of Transportation (DOT) Hazardous Materials Regulations (49 CFR 171), and federal regulations which govern occupational exposure to hazardous materials (29 CFR 1910).

Within the WRAIR, efforts to minimize the use of hazardous chemicals include substituting less hazardous materials when possible and procuring minimal quantities of hazardous chemicals when no substitution is possible. All incoming chemicals must be separated and stored in approved cabinets located outside of the laboratory area All chemical storage cabinets or refrigerators must be labeled to include a warning of the hazard contained within (e.g., Ignitable, Corrosives, Reactives, and Toxics), Cabinets are designed to contain any spills which may occur. Personnel must inspect chemicals when received to assure that the packaging is intact and that no leakage has or is occurring. Chemicals must be stored in intact, labeled containers. The label on each chemical container must include the chemical name; its hazard classification; and the name, address, and emergency phone number of the chemical manufacturer. NFPA 704 signs must be posted on the outside of each laboratory door indicating the nature of chemical hazards within the laboratory in accordance with the guidelines of the NFPA Guide on Hazardous Chemicals. Storage of chemicals in individual laboratories is restricted to one pint (500 milliliter) or a five day supply (whichever is greater). The storage of chemicals must be accordance with the guidelines of NFPA which list the conditions under which it is safe to store various chemicals and the chemicals which may be safely stored together.

In accordance with WRAIR Regulation 385-10, the WRAIR CHP, and 29 CFR 1910 (Occupation Safety and Health [OSHA]), all users of hazardous chemicals must maintain inventories. A WRAIR-wide computer system (CHEMIN) maintains an inventory of all chemicals in use throughout the WRAIR. New chemicals must be added to the list as they are obtained, and the entire list is updated on a quarterly basis. The Chemical Inventories of both the WRAIR Main and the WRAIR Forest Glen are available in the WRAIR Safety Office. Chemical inventories must also be located in each of the laboratories within the WRAIR.

In accordance with 29 CFR 1910.1045 (Hazard Communication) and WRAIR Regulation 385-10, all employees handling hazardous chemicals are trained and knowledgeable regarding the chemicals that they use. The laboratory supervisor (or PI) must assure that all personnel have received adequate training. The chemical health and

safety information which must be made available the personnel includes the contents of the OSHA Laboratory Standard (and Appendices), the location and availability of the CHP, Permissible Exposure Limits (PELs) for OSHA regulated substances, an explanation of and information regarding the location of Material Safety Data Sheets (MSDS), and the physical and health hazards of the chemicals which the personnel will be using. MSDSs for chemicals used in WRAIR laboratories are available from the WRAIR Safety Officer and must be located in a easily identifiable location within each laboratory. Recently, the WRAIR library purchased a computerized MSDS system. This system is available to the entire WRAIR over the Local Area Network (LAN) system.

The WRAIR must comply with all aspects of the OSHA Hazard Communication Standard which mandates access to information and training regarding the handling, use, and storage of designated hazardous chemicals (29 CFR 1910.1200). In compliance with the Hazard Communication Standard, the WRAIR Safety Office must maintain a list of all hazardous chemicals. Each individual laboratory must maintain a list of the chemicals used within the laboratory, and persons in the laboratory are responsible for being informed regarding the hazards associated with exposure to and use of the chemicals with which they work. In compliance with the Hazard Communication Standard, MSDSs are available for all chemicals on the inventory list. With the exception of chemicals under development in research laboratories, an MSDS must be available in each laboratory area for each hazardous chemical present. The OSHA standard also requires that warning labels be present on all containers with hazardous chemicals and that all employees receive training regarding the safe handling, use, and storage of hazardous chemicals. WRAIR employees are trained and knowledgeable about laboratory hazard information. Supervisors are responsible for ensuring the safe operation of the laboratory and enforcing safety practices by employees.

Compressed gases used at the WRAIR include oxygen, hydrogen, helium, nitrous oxide, argon, propane, methane, liquid nitrogen, ethylene oxide, and mixed gases (carbon dioxide and air; carbon dioxide and nitrogen; carbon dioxide and oxygen; and carbon dioxide, oxygen, and nitrogen) (Mueck, 1992). Compressed gas cylinders must be managed in accordance with WRAIR Regulation 385-10, AR 700-68 (Storage and Handling of Compressed Gases and Gas Cylinders), WRAMC Regulation 742-1 (Compressed Gas Cylinders and Bilk Oxygen Quality Control) and guidelines of the Compressed Gas Association, Incorporated (Mueck, 1992). Cylinders must be securely stored in approved areas, grouped by gas type and hazard classification Full tanks and empty tanks are stored separately. All cylinders must be clearly labeled at all times.

2.7.2.7 Recombinant DNA

Work involving recombinant DNA is conducted in accordance with <u>Guidelines for Research Involving Recombinant DNA Molecules</u> (Federal Register, May 7, 1986). These guidelines have the force of law for facilities receiving NIH funding. The DoD has elected to adopt and mandate compliance with these guidelines for all DoD-sponsored activities

involving recombinant DNA (BDRP 1989). As recommended in the guidelines, the WRAIR Institutional Biosafety Committee (IBC) provides oversight for all activities involving recombinant DNA. This committee is composed of scientists with expertise in recombinant DNA as well as members of the local community. The WRAIR Laboratory Safety Committee reviews all projects involving recombinant DNA and makes recommendations regarding biosafety and procedures. All individuals working with recombinant DNA are trained in the safety procedures required for vaccine production and use of infectious or potentially infectious material. WRAIR Regulation 385-10 specifies the procedures for this oversight. The Guidelines for Research Involving Recombinant DNA Molecules is the NIH document controlling the actual conduct of research. The WRAIR must comply with government regulations and guidelines regarding biological containment. The WRAIR Laboratory Safety Advisory Committee must review all research protocols including those involving recombinant DNA. Following its review, the committee submits recommendations concerning biosafety and procedural guidelines.

2.7.3 Waste Stream Management

2.7.3.1 General Solid Waste

WRAIR Regulation 385-10 (Chapter 20, Draft) describes the handling and disposal of waste materials generated from WRAIR Activities. The WRAIR Environmental Coordinator manages waste disposal methods within the WRAIR and must assure that waste disposal practices comply with applicable Army, federal, state, and local regulations.

All wastes must be separated at their point of origin and disposed of in accordance with WRAIR regulations. General solid waste is defined by WRAIR Regulation 385-10 (Chapter 20, Draft) as waste not contaminated with radioactive or hazardous material and not meeting the criteria for regulated medical waste. This waste may be disposed of through normal means without pretreatment. General solid waste must be sealed in plastic trash bags (green, brown, black, or white). Bulk glass waste (not contaminated with infectious, hazardous, or radiologic waste) must be packed and sealed in sturdy containers prior to disposal as general waste.

General solid waste from WRAIR Forest Glen activities is transferred by a commercial refuse service to the Montgomery County Sanitary and fill located in Laytonsville, Maryland. This landfill receives approximately 2,000 tons of solid waste daily (The New WRAIR EA). General solid waste from WRAIR Main activities is transported to the I-95 Landfill located in Lorton, Virginia. This landfill receives approximately 5,400 tons of general refuse daily from all sources (East, 1992). The WRAMC contracting office only records quantities of general solid waste generated by the entire WRAMC installation and not its tenant activities.

2.7.3.2 Regulated Medical Waste

According to WRAIR Regulation 385-10 (Chapter 20, Draft), sharps (used or unused), blood and blood products, pathological waste, animal waste, microbiological waste, and radioactive waste are handled and disposed of as regulated medical wastes. Regulated medical wastes are treated, handled, and disposed of in ways which minimize or negate potential health risks to the individual or community.

Any waste containing infectious material must be rendered non-infectious by physical (autoclave) or chemical disinfection (bleach) prior to entering waste stream processing. Quality control procedures which verify the ability of an autoclave to render infectious material sterile must be performed weekly. A log detailing the implementation and results of these procedures must be maintained for each individual autoclave (WRAIR Regulation 385-10, Chapter 20, Draft).

Sharps

Sharps are defined by WRAIR Regulation 385-10 (Chapter 20, Draft) as any object, used or unused, that may penetrate the skin. Items classified as sharps include syringes (with or without an attached needle), hypodermic needles (used or unused), glass slides, cover slips, blood collection tubes and vials, test tubes, metal sharp objects such as razor blades, Pasteur pipettes, microsample pipette tips, and broken glass. The WRAIR Main generates about 630 pounds of waste sharps monthly (Mueck, 1992). The WRAIR Forest Glen activities generate approximately 600 pounds of waste sharps per month (Mueck, 1992) Sharps must be rendered non-infectious by physical (autoclave) or chemical (bleach) disinfection prior to entering waste stream processing. Sharps must be discarded immediately following use into rigid, plastic puncture-resistant container. Full, partially full, or empty vials of vaccine agents must also be disposed of in sharps containers after deactivation of live vaccine. Disposable syringes must not be recapped, cut or bent prior to disposal. Sharps containers must be securely sealed and labeled (two biohazard labels and one "burns" label) when three-quarters full. The containers must be brought to the infectious waste storage shed on the loading dock and secured.

Waste sharps are boxed, labeled, and manifested in accordance with Maryland special medical waste regulations. The American Waste Company picks up the sharps from both WRAIR Main (Building 2) and WRAIR Forest Glen (Building 511) and transfers them to Consumat Medical Services, Inc., in Baltimore, Maryland, for incineration (see Section 2.7.3.3).

Pathological Waste

WRAIR Regulation 385-10 (Chapter 20, Draft) defines pathological waste as human or laboratory animal tissues, organs, body parts removed during surgery, autopsy, necropsy or other medical procedures. Policies regarding packaging, labeling, handling, and disposing

of pathological and animal wastes must comply with local, state, DA, and federal requirements and are implemented by the Director, Division of Veterinary Medicine. The WRAIR Main generates approximately 2,000 pounds of pathological waste per month (Mueck, 1992). The WRAIR Forest Glen generates about 1,000 pounds of pathological waste per month. The pathological waste generated by WRAIR activities is incinerated in the medical waste incinerator located at the WRAIR Forest Glen (see Section 2.7.33).

Pathological waste, except radioactive pathological wastes (see Section 2.83.5), must be double-bagged in clear plastic bags, sealed, and labeled with the name of the department, a point of contact, phone number and biohazard information if applicable. Labeled and sealed bags must be immediately frozen in the marked ("Caution Pathological Waste") freezers located in WRAIR Main (fourth floor) or WRAIR Forest Glen Building 511 (loading dock).

Pathological waste generated at the WRAIR Main is transported to the WRAIR Forest Glen for incineration. The Director of the Division of Veterinary Medicine must maintain a written procedure assuring that the transportation of pathological waste complies with all applicable Environmental Protection Agency (EPA), DOT, state, and local regulations. Pathological waste must be transported by the Division of Veterinary Medicine to the Veterinary Medicine Building (Building 511) at WRAIR Forest Glen for incineration. All applicable state and local laws must be followed during the transport of pathological waste. The transport vehicle, certified by the State of Maryland, is an enclosed, environmentally controlled, government vehicle (WRAIR Regulation 385-10, Chapter 2O, Draft). For information regarding the WRAIR special medical waste incinerator see Section 2.733.

Animal Waste

Contaminated or potentially contaminated animal waste (bedding and excretions) which has been rendered non-infectious by physical or chemical means may be disposed of as general solid waste (see Section 2.73.1) (WRAIR Regulation 385-10, Chapter 20, Draft). Contaminated animal waste which has not been rendered non-infectious must be bagged, boxed, labeled, and turned-in as regulated medical waste for incineration (see Section 2.733).

Blood and Blood Products

Disposal of free flowing blood, plasma, serum, blood derivatives, vaccines, and gauze and bandages saturated with blood or other potentially infectious material are disposed of as regulated medical waste in accordance with WRAIR Regulation 385-10 (Chapter 20, Draft). This type of waste must first be placed in plastic bags which are then placed within a second container, such as a cardboard box The box must then be labeled with a "burn" label and two biohazard stickers. Blood and blood products in breakable containers must

be placed within rigid, puncture-resistant leak-proof containers. For information regarding the WRAIR special medical waste incinerator see Section 2.733.

Microbiological Waste

According to WRAIR Regulation 385-10 (Chapter 20, Draft), microbiological waste such as cultures from medical and pathology laboratories, culture Basks, dishes, and devices used to inoculate, transfer, and mix cultures must be handled and disposed of as regulated medical waste. Such waste must be placed within special plastic bags and then within rigid containers which will prevent puncture. The box must be labeled with a "burn" label and at least two biohazard signs. For information regarding the WRAIR special medical waste incinerator see Section 2.7.3.3.

Liquid microbiological wastes which have been sterilized by autoclave in accordance with WRAIR Regulation 385-10 (Chapter 20, Draft), may be discharged to the sanitary sewer system. Liquid microbiological waste in glass, may be sterilized by autoclave and placed into a sharps container for disposal as regulated medical waste (WRAIR Regulation 385-10, Chapter 20, Draft).

2.733 Special Medical Waste Incinerator

As indicated in WRAIR Regulation 385-10 (Chapter 20, Draft), certain regulated medical wastes generated from WRAIR Main and WRAIR Forest Glen activities are incinerated in the special medical waste incinerator located at the WRAIR Forest Glen (see Figure 2-2). The Director, Division of Veterinary Medicine, is responsible for assuring that the medical waste incinerator is maintained and operated properly. In addition, this individual must maintain written procedures for operating the incinerator and must maintain all record keeping requirements.

The incinerator is a Consumat Model C-125-P Special Medical Waste Incinerator rated at a capacity of 350 pounds of waste per hour. The Maryland Department of the Environment (MDE) issues a permit for WRAIR to operate the incinerator. The total volume of solid waste burned in the WRAIR Forest Glen incinerator is approximately 6,000 pounds per month (see Section 535 and Appendix D) (Mueck, 1992). Approximately 1,600 - 2,000 pounds of waste per month is from WRAIR Main activities and approximately 1,000 pounds of waste per month is waste generated from WRAIR Forest Glen activities. The remainder of the pathological waste burned is generated by Armed Forces Institute of Pathology (AFIP) and WRAMC activities. Because of the volume of material burned by the WRAIR incinerator regulations require MDE to make inspections of the incinerator at least annually. The incinerator was inspected four times during 1991 and was found to be in compliance with all operating requirements of MDE. The incinerator burns at 1,400 degrees Fahrenheit in its lower chamber and has a stack temperature of 1,800 degrees Fahrenheit.

In August, 1992, WRAIR stopped using yellow plastic bags for bagging pathological wastes for incineration after the AFIP determined that the yellow plastic bags contained high levels of chromium which resulted in elevated chromium content of incinerator ash. Clear plastic bags with a red biohazard symbol are now used in place of the yellow bags (Johnson, 1992; Roberts, 1992). Incinerator ash which had high chromium content was disposed of by the WRAMC as hazardous chemical waste through the Defense Reutilization and Marketing Service (see Section 2.7.3.4).

The incinerator complies with all federal air quality standards and with State of Maryland Toxic Air Pollutant (TAP) Regulations (COMAR 26.11.15). The State of Maryland incorporates EPA regulations for air quality standards implemented pursuant to the 1977 Clean Air Act and amendments. Citations include 40 CFR 50, 51, 52, 57, 60, 61, 80, and 82. Subjects covered include ambient standards, new stationary sources, hazardous pollutants, and related topics. WRAMC implements the 1977 Clean Air Act Amendments through AR 200-1. The MDE implemented regulations governing acceptable ambient levels for approximately 600 Toxic Air Pollutants (TAPs) in 1990 (COMAR 26.11.13). A TAP is a substance which causes or is suspected to cause adverse human health effects but is not a pollutant included in the National Ambient Air Quality Standards. MDE has developed methods for determining screening levels for these TAPs which describe the maximum threshold levels to which the surrounding population may be exposed without unreasonable acute or chronic health risks. CO MAR 26.11.15 requires sources of TAPs to comply with standards including those otherwise exempted by COMAR 10.18.02.02.03. The estimated atmospheric release of TAPs during the conduct of routine activities of the WRAIR is extremely small and well below the quantity allowed by the TAP regulations of the State of Maryland. There is no history of permit denial by MDE for this incinerator. Recent permits' inspection reports, and the TAP compliance demonstration from MDE for the incinerator at WRAIR Forest Glen are included as Appendix D.

2.7.3.4 Hazardous Chemical Waste

Chemical disposal procedures at the WRAIR are in accordance with the Resource Conservation and Recovery Act (RCRA) of 1976 as amended (Public Law 94-580: 40 CFR 260-261) and the State of Maryland Disposal of Controlled Hazardous Substances Regulations (COMAR 26.13.01-10). In accordance with AR 200-1 (Section 6-5), all hazardous waste handling procedures and reporting requirements related to RCRA are the responsibility of the WRAMC because the WRAIR is a tenant organization of the WRAMC. A site complaint (April 18, 1991) issued by the MDE for failure to submit generator reports for 1989 and 1990 against the WRAMC has been corrected. The WRAIR qualifies as a small generator of hazardous waste (facility generates/accumulates less than 1,000 kilograms/month of chemical hazardous waste) under CFR 2615. The WRAMC is registered with the EPA (EPA generator identification number MD6210020743). Waste chemicals which are designated as hazardous chemical wastes in accordance with RCRA (40 CFR 261), COMAR, and WRAIR regulations must be placed in individual sealable containers and identified with a hazardous waste label indicating the contents of the

container, date, and generator. Wastes must be turned-in every Friday at the Forest Glen hazardous waste bunker (building 507) Wastes generated at the WRAIR Main must be taken to the loading dock of WRAIR Main on Thursdays. Recyclable hazardous wastes as defined in WRAIR Regulation 385-10, may be transferred to another authorized user. An MSDS must accompany the chemical and the WRAIR Chemical Inventory (see Section 2.7.2.6 must be updated. Before off-site disposal, waste chemicals must be stored in an approved chemical storage bunker at WRAMC The WRAMC DEH has a contract with a commercial waste contractor for the removal of hazardous waste. Laidlaw Environmental Services, Inc., which routinely removes the hazardous wastes from the WRAMC in accordance with 40 CFR and State of Maryland hazardous waste disposal regulations (COMAR 26.13.01-10), currently provides this service (Mueck, 1992). The WRAIR Forest Glen generates approximately 150 pounds of hazardous waste per month. The WRAIR Main generates approximately 1,000 pounds of hazardous waste per month (Mueck, 1992).

2.7.3.5 Radioactive Waste

The WRAMC Health Physics Office is responsible for assuring that the disposal of radioactive waste materials complies with all applicable federal, state, and Army regulations, directives and guidelines. NRC, Army (AR 385-10, AR 385-11), WRAMC regulations (WRAMC 40-10, WRAMC 385-11), and WRAIR Regulation 385-10 (Chapter 20, Draft) regulate the disposal of radioactive waste.

Radioactive material disposal at the WRAIR must be in accordance with WRAMC Regulation 40-10 (Medical Services, Health Physics), federal regulations, and State of Maryland radiation regulations (COMAR 26.12.01 and .02). The radiological waste contractor and the rules which the contractor follows are determined in accordance with AR 385-11 (Ionizing Radiation Protection; Licensing, Control, Transportation, Disposal, and Radiation Safety) by the U.S. Army Armaments Command (WRAMC Regulation 40-10).

Radioactive pathological waste must be handled in accordance with WRAIR Regulation 385-10 (Chapter 20, Draft) and WRAMC Regulation 40-10 (Chapter 8). The waste generator must double-bag radioactive waste in clear-colored plastic bags which are taped closed and labeled with the investigators name, authorization number, contents, radioisotopes, activity of material, and waste category. The WRAMC Health Physics Office then must package the waste in alternating 10-inch layers of waste and packing materials.

Radioactive waste materials, including animal carcasses, are grouped and packaged according to the type, form (e.g., solid, liquid, animal carcasses/waste), and half-life of the radioactive material. Infectious wastes must first be disinfected prior to turn in to WRAMC Health Physics. Solid radioactive wastes must be placed in clear plastic bags or a plastic-**container** and marked with the international symbol for radioactive material. Bulk radioactive liquids must be placed within a suitable bottle (plastic or glass) which must be sealed and labeled. Titanium-containing waste liquid must be placed in glass bottles. Radioactive hazardous waste (including scintillation vials containing waste) must be dated

and labeled with the radiation symbol as well as the words "hazardous waste". Used scintillation vials must be tightly sealed and conspicuously labeled as containing radioactive material. Sharps contaminated with radioactive material must be sealed and tagged to indicate radioactive material.

Radioactive waste material is not permitted to be released into the sanitary sewer system unless it is water soluble and readily dispersible in water, and the release is in accordance with the Radioactive Material Authorization (WRAMC 40-10). All such discharges must be fully documented according to NRC and WRAMC regulations. The total monthly quantity released by all WRAMC and WRAIR activities may not exceed 100 microcuries.

Wastes are packaged for transport according to instructions provided by the contractor and in accordance with 10 CFR 71 (NRC Regulations for Packaging and Transportation of Radioactive Material). Packaged materials are labeled with the authorization number, contents; chemical and physical form of the base material; and the radioisotope, activity, and waste category. Individual users bring packaged radioactive waste material to a central handling and storage location within each department. The WRAMC Health Physics Office inspects facilities at least monthly and removes all accumulated radioactive wastes weekly from laboratories. The WRAMC Contracting Office only records quantities of radioactive waste generated by the entire WRAMC installation. Records of the quantity of radioactive wastes generated for WRAIR activities are not maintained, but are estimated to be a small percentage of the total radioactive wastes generated. The radioactive wastes generated at WRAIR Main are transported in a sole-use vehicle to the WRAIR Forest Glen for consolidation prior to pick up by a contractor for disposal. The contractor for radioactive waste is the Chemical Nuclear Corporation, under the contract management of Army Materiel Command (AMC), Rock Island, Illinois. The ultimate disposal site for the organic solvents used for liquid scintillation fluid (low level radioactive wastes) is Tennessee. The ultimate disposal site for solid radioactive wastes is South Carolina (Mueck, 1992).

2.73.6 Wastewater

Wastewater originating from the WRAIR Main is discharged to the Washington, DC sewer system. The wastewater originating from WRAIR Forest Glen is discharged to a Washington Suburban Sanitary Commission (WSSC) sewer main which eventually connects to the DC system. Wastewater from both the WRAIR Main and the WRAIR Forest Glen is ultimately treated at the Blue Plains wastewater treatment plant and discharged to the Potomac River. For additional information regarding projected wastewater volumes see Section 5.2.4.1

2.7.4 Accident Response

2.7.4.1 Hazardous Chemicals

If a spill occurs, the response will be specific to the nature of the substance involved and in accordance with WRAIR Regulation 385-10 (Chapter 9) and the WRAIR CHP. The WRAIR has written procedures for chemical handling and disposal which reduce the probability of accidents. However, the aggregate quantity of all of the hazardous chemical material contained within the facility would not require reporting under federal or state regulations because the entire inventory is less than any reportable quantity mandated by federal and state hazardous waste regulations (40 CFR; COMAR 26.13). In accordance with WRAIR Regulation 385-10 and the WRAIR CHP, however, a spill report must be furnished to the WRAIR Safety Officer.

Spills in the building must be contained and cleaned. For small spills personnel use a spill cleanup kit consisting of absorbent spill pillows and absorbent powdered agents to handle chemical spills. After cleanup kit materials are collected and disposed of as hazardous chemical waste (see Section 2.73.4). For larger spills? personnel must evacuate the area and immediately telephone the WRAMC Spill Control Center (WRAMC Fire Department). Chemical spill clean-up kits are located at various locations throughout the building.

2.7.4.2 Etiologic Agents

Response to spills involving biological infectious material (including toxins) must be conducted in accordance with WRAIR Regulation 385-10 (Chapter 11 Biological/Infectious Material and Waste).- This regulation requires the evacuation of laboratories in which spills have occurred. Id such an event workers evacuate the room, close the door, and place their outer protective garments into a clear biohazard bag for sterilization. The laboratory supervisor and the department chief are notified. WRAIR Regulation 385-10 (Chapter 11) details notifications required and telephone numbers for contacting the appropriate individuals during or after duty hours.

Personnel wearing the appropriate protective clothing (e.g. long sleeved gown mask gloves, respirator) handle spill cleanup procedures. Re-entry does not occur until 30 minutes after the spill has occurred and any aerosol droplets have had a chance to settle. The **spill** is then covered with absorbent materials (diapers or paper towels) and drenched with a disinfectant (e.& one percent sodium hypochlorite). After a contact time of at least 20 minutes the absorbent materials are placed in a clear biohazard bag for sterilization by autoclave. Personnel protective equipment is also removed for disinfection or autoclave. All materials used for cleanup and all contaminated materials must either be sterilized by autoclave or disposed of as infectious waste (see Section 2.732). A spill report is submitted to the WRAIR Safety Office (WRAIR Regulation 385-10).

2.7.43 Radioactive Materials

WRAIR Regulation 385-10 describes the notifications and actions personnel should take in the event of a radioactive materials spill. In the event of such an incident, all personnel will immediately evacuate the area and close the door. Personnel then must remove contaminated garments and place them in a container for later disposal as radioactive waste. Laboratory supervisors and the WRAMC Health Physics Office are notified. Personnel involved in cleaning the spill must wear the appropriate personal protective equipment (e.g. long-sleeved gown, face mask, disposal gloves) and wait at least 30 minutes before entering the spill area Spills are covered with absorbent towels or diapers which are then saturated with decontaminating solution. Personal protective equipment is removed and decontaminated. Personnel use forceps to gather all materials used in the cleanup and decontamination of the spill and then place them within magenta plastic bags and dispose of them as radioactive waste (see Section 2.7.35). A meter is used to survey the area of the spill as well as the hands and clothing of involved personnel for radioactivity. The WRAMC Health Physics Office must issue an "all-clear" before normal operations may proceed in the affected area A spill report is forwarded to the WRAIR Safety Office.

2.7.4.4 Emergency Procedures

The WRAIR Regulation 385-10 (Chapter 2, Emergency Procedures) discusses the roles and responsibilities of all personnel "assigned, attached or employed by WRAIR and its activities" in the event of medical emergencies, fire, or spills (biological, chemical, radioactive material). The WRAIR Safety Officer is responsible for emergency response training, accident review and investigation, and for acting as a liaison between WRAIR and emergency personnel during emergency situations. WRAIR Regulation 385-10 describes notification procedures and phone numbers for medical emergencies (WRAMC Main Post Emergency Room), fire (WRAMC Fire Department), acute hazardous materials spills (WRAMC Spill Control Center), other chemical spills, biohazard/infectious agent spills, radioactive material spills (WRAMC Health Physics), and other emergencies. All divisions within WRAIR maintain an Emergency Evacuation Plan which is filed with the WRAIR safety office.. Should conditions require the evoking of emergency procedures, the division director or department chief submits a written report of the incident to the WRAIR Safety Office. Division directors must account for all personnel during an emergency. Outside agencies which would be notified in the event of an emergency include the NRC in the event of a radioactive spill and the local fire department in the case of fire (Mueck, 1992). The BDRP FPEIS determined that such emergencies are improbable. Because the research methods analyzed in the BDRP FPEIS are parallel to the work performed at the WRAIR, no accidents of a serious nature related to research operations are anticipated (BDRP FPEIS, 1989). Many of the higher risk research methods utilized at the WRAIR, and the safety, security, and operational controls, and accident response measure associated with their use, were previously examined in the BDRP FPEIS. That analysis concluded that with

the use of the safety, security, and operational controls and accident response measures no accidents of a serious nature related to research operations were anticipated.

2.7.5 Accident Investigation

Laboratory accidents must tee reported directly to the laboratory supervisor. All spills are recorded, and a written log of such events, including suspected cause and exposure, must be maintained. WRAIR safety officers are responsible for all safety issues within their facilities. Violation of safety regulations, including misuse of hazardous materials, requires that the individual involved and the safety officer prepare a written report. Based on this information, the safety officer may initiate an investigation and prepare a written report of findings which is submitted to the WRAIR Safety Officer through the chief of the department and division director.

2.7.6 Orientation and Training

The WRAIR Safety Program requires all laboratory work at the WRAIR to be performed under written protocols prepared by the staff and reviewed by scientific and safety authorities. These protocols describe the safe and proper operation of every recurring hazardous activity conducted at the WRAIR and incorporate requirements established under federal, state, local, and institutional regulations. New employees must read and understand the protocols relative to their duties before engaging in these laboratory activities Section chiefs, department heads, laboratory supervisors, and safety officers periodically review work routines to ensure that they are consistent with all applicable safety regulations. These reviews are not formally documented, but the monthly safety inspections are documented and filed with the WRAIR Safety Office. Safety reviews are conducted quarterly, and an annual safety review is fully documented. The adequacy of written protocols and WRAIR Regulation 385-10 must be reviewed annually but may be done at shorter intervals when required.

In accordance with AR 385-10 and WRAIR Regulation 385-10, the WRAIR Safety Program must provide appropriate safety and occupational health training to all relevant personnel. The WRAIR safety manager and division/department safety officers complete formal training In addition to meeting criteria specified in AR 385-10, the WRAIR safety manager completes approximately 270 hours of specialized training in the following areas: Life Safety Code (NFPA), OSHA inspections, hazardous material training (including defense hazardous materials), biohazards in research laboratories, hazard communication regulations and procedures, packaging and shipping of etiologic agents, and blood and blood born pathogens. The WRAIR division/department safety officers must attend the Collateral Duty Safety Officer Training Course (offered by the WRAMC Safety Office), DoD hazard communications course (offered by the WRAIR Safety Office), and at least two additional laboratory safety training courses annually. Division collateral safety officers at the WRAIR receive blood and bloodborne pathogen training, fire prevention, and laboratory safety training. Divisions involved in BDRP work must attend a BDRP-specific safety course

(offered by the WRAIR Safety Office). Division chemical hygiene officers must attend the Defense Material/Waste Handling Course (offered by the WRAMC Preventative Medicine Section and the Army Logistics Management College), and two additional laboratory training courses annually (WRAIR Regulation 385-10). All employees must attend two training sessions each year as a condition of their performance reviews. Supervised training is also provided to employees when new research and diagnostic protocols are instituted (WRAIR Regulation 385-10). All employees handling radioactive material must receive initial and periodic training on storage, transfer, and use of radioisotopes through the WRAMC Health Physics Office. At approximately annual intervals, the Montgomery County Fire Department provides training in fire procedures to the WRAIR Forest Glen employees. The WRAIR Safety Program (WRAIR Regulation 385-10) has been distributed throughout the WRAIR

Routine operations at the WRAIR must adhere to both federal and institutional safety regulations. Compliance with appropriate regulations is accomplished through compliance with WRAIR Regulation 385-10 and approved experimental protocols. New laboratory personnel receive safety training prior to working with infectious agents. Safety procedures are reviewed when new agents are received and/or when experimental protocols are revised. The WRAIR must comply with federal, state, and local health and safety regulations (see Section 2.7). A handbook regarding laboratory animal use and care was written and distributed during FY 1990-1991 and 35 training classes in animal use were held (WRAIR, 1992). In FY 1990, 29 training classes that concentrated on safety and chemical hygiene were held. In FY 1991, 33 such training classes were held.

2.7.7 Safety Inspection and Monitoring

Federal, DoD, DA, and WRAIR regulations require that particular phases of laboratory operations be inspected at periodic intervals. Laboratory equipment is inspected routinely under a preventive maintenance programs. Biological safety cabinets and autoclaves must be inspected and certified upon installation, annually, and subsequent to relocation within the facility (see Section 2.7 2.1).

In accordance with WRAIR Regulation 385-10 (Chapter 17, Safety Inspections), the WRAIR safety officer, chemical hygiene officer, and radiation protection officer must inspect all laboratories, activities, and leased facilities of the WRAIR. In addition, WRAIR division directors must ensure that all division activities are inspected semi-annually for safety (with results submitted to the WRAIR Safety Office). Within each division and department of the WRAIR, safety officers and chemical hygiene officers must conduct monthly safety and chemical hygiene inspections. Laboratory supervisors must conduct weekly safety inspections of the laboratories for which they are responsible. If any deviation from standard policies and practices is observed during these inspections, supervisors must note discrepancies and take all appropriate actions to alleviate them. All notes and inspection results must be maintained in files. The results of monthly, semi-annual, and annual inspections are forwarded to and maintained by the WRAIR Safety Office.

In accordance with USAMRDC policies and regulations, a representative from the Safety Office of the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) must conduct an annual inspection of BSL-3 laboratories to ensure adherence to appropriate BSL-3 standards. Records of inspections are to be available from the Safety Officer and will be retained on file for at least three years.

2.7.8 Medical Monitoring of Personnel

New employees are given initial and periodic physical exams before and during their employment at the WRAIR The WRAMC Occupational Health Clinic cooperates in placing personnel working in laboratories using materials which require special provisions into medical monitoring or vaccination programs. The Division/Department Director keeps records of personnel on special programs (WRAIR Regulation 385-10). Additional practices and procedures required are detailed in WRAIR Regulation 385-10 and individual laboratory protocols.

Guidelines on employee health and safety require that employees with the potential for contact with a pathogenic organism receive appropriate immunization. No special vaccinations are currently required of WRAIR workers, although hepatitis B vaccine is required for active duty military personnel and is voluntary for DA civilians. The Division/Department Directors maintain records of all personnel requiring special medical programs (medical monitoring or vaccinations) (WRAIR Regulation 385-10).

Personnel in some laboratories are monitored by serosurveillance for infections. Serosurveillance is a measurement of specific antibodies in the bloodstream. Changes in the concentration of these antibodies over time could be an indication that the worker was exposed to an etiologic agent. The serum of new employees is tested and frozen for storage. Every six months thereafter repeat serum samples are taken, tested, and frozen in order to maintain an employee-specific serum history which will provide a determination of the time course of antibody production in the event of exposure to an etiologic agent. In the case of an accident, two samples are drawn, one immediately after exposure and the second 21 days later. A medical authority renews and interprets the results of serosurveillance testing. Consultation with a physician is provided to personnel with suspected exposures to infectious agents. In the event of illness and injury personnel are referred to the WRAMC Occupational Health Clinic for diagnosis, treatment, and if necessary, for professional counseling (Mueck, 1992).

2.8 Special Considerations

2.8.1 Care and Use of Animals

The WRAIR Division of Veterinary Medicine provides production, procurement, quarantine, issue, basic animal husbandry, and veterinary care for laboratory animals in use at WRAIR. The primary animal facility for the WRAIR is WRAIR Forest Glen Building

511. This facility houses guinea pigs, rabbits, ferrets, rats, mice, cats, dogs, monkeys (squirrel monkeys and Rhesus monkeys) (approximately 500), sheep, and pigs. Sheep are kept for respiratory studies, and pigs are kept for cardiac work. Dogs and cats are maintained for the training of veterinary technicians. Cats are not used for experimentation. The vast majority of the monkeys housed in this facility are no longer involved in experimental protocols.

The care and use of laboratory animals at the WRAIR must comply with standards and guidelines specified in AR 70-18 (The Use of Animals in DoD and DoD-Sponsored Programs) which incorporates federal and DoD regulations and policies including the requirements of the Animal Welfare Act (9 CFR). Animal handling practices and the quality of care at the WRAIR must comply with the <u>Guide for the Care and Use of Laboratory Animals</u>. HHS Publication No. 86-23 (National Research Council, 1985). Duties and responsibilities of individuals with regards to the care and use of animals within WRAIR are described in WRAIR Regulation 385-10. Section 2.8.5.2 details concerns regarding current WRAIR animal care facilities.

The Laboratory Animal Care and Use Committee (LACUC) must review all protocols requiring animal subjects. This committee is overseen by the WRAIR Quality Assurance Committee (see Section 2.83). The WRAIR LACUC reviews protocols on a monthly basis. In FY 1990, 43 large animal, 59 small animal, and 14 pilot study protocols were approved. In FY 1990, 47,000 animals were provided to the WRAIR, WRAMC Clinical Investigation Program, and the USAIDR. In FY 1991, 45,557 animals were provided (WRAIR, 1992).

Veterinary technicians perform a weekly animal census which includes information regarding animal numbers and location as well as tracking of direct costs of animal purchase, housing and care. The WRAIR September 1992 animal census included 3,519 mice, 1,178 rats, 441 hamsters, 332 guinea pigs, 342 rabbits, 191 monkeys, 66 dogs, 32 cats, 17 sheep, 9 pigs, and 6 ferrets (Roberts, 1992). This information is compiled for the annual U.S. Department of Agriculture (USDA) Report (WRAIR, 1992).

Personnel are protected from exposure to infectious agents when using animals by adhering to the requirements of the appropriate Animal Biosafety Level (ABSL) as described in CDC/NIH Guidelines. ABSLs include animal handling practices, protocols, equipment, and facilities appropriate for work with infected animals and correspond to the level of risk associated with the etiologic agent involved (CDC/NIH, 1988). When ABSL-3 animal practices are required they include decontamination of all surfaces after spills, prohibition of smoking, eating, and drinking in animal rooms, washing of personnel hands after handling cultures, and inward opening doors to rooms housing infected animals.

In the event that an individual is bitten or scratched by an animal or is stuck by a needle which has been used on an animal, the employee is required to report the incident to a supervisor or safety officer and report to the emergency room for appropriate medical

care (WRAIR Regulation 385-10). If the bite, scratch or stick involves a non-human primate, a report must be made to the Veterinary Duty Officer and the Department of Infectious Diseases.

In addition to these procedures, cages housing potentially infectious animals must be autoclaved prior to cleaning activities and animal disposal, and personnel must wear protective boots, surgical masks, gloves, and solid-front/wrap-around type gowns when working with infected animals. All infected animal wastes must be autoclaved and incinerated (see Section 2.73.2). Leak proof containers must be used when transporting animal carcasses. Laboratory managers/supervisors advise personnel of potential hazards, and access to rooms housing infected animals is restricted to necessary personnel. Measures to prevent or reduce generation of incidental aerosols during laboratory activities are implemented.

Dirty cages and carcasses from WRAIR Main are transported in a truck which has been certified by the State of Maryland for transport of regulated medical waste to the WRAIR Forest Glen cage washers and incinerator (see Section 2.733). Carcasses are brought from WRAIR Main once a week to be burned in the Forest Glen incinerator. All primate bedding and bedding from animals in quarantine are burned. Bedding from all other animals is disposed of as ordinary solid waste (see Section 2.73.1). Sewage from the Building 511 goes into the sanitary sewer. MSDSs on the detergents are available. Water usage in the Veterinary Medicine facility is high. In addition to cage washing, personnel wash down the primates and dogs in the facility twice per day.

Herpes B is a viral disease of non-human primates which is transmissible to and incurable in humans. There are currently about 24 known Herpes B positive monkeys maintained by the WRAIR Main and WRAIR Forest Glen (Roberts, 1992). However, all Old World monkeys housed at WRAIR facilities are handled with the same level of precaution that would be used were the monkey known to harbor the Herpes B virus. Worker precautions include the use of gowns, gloves, and masks. Needles are not capped prior to placement in sharps disposal containers. Within the past five years, one human has tested positive for the herpes B virus while working at the WRAIR (Roberts, 1992). A policy for the care of monkeys testing positive for Herpes B is currently under development in coordination with the NIH (Hall, 1991).

2.8.2 Use of Human Subjects

Studies involving the use of human subjects must comply with AR 70-25 (Use of Volunteers as Subjects of Research), FDA regulations (21 CFR Subchapters A, D, and H), and DHHS regulations (45 CFR 46 -Protection of Human Subjects) and all other applicable federal, state, DoD, and DA regulations and guidelines. Review and approval for clinical protocols must also be obtained by host nation authorities if a protocol is conducted in a country other than the United States.

The WRAIR Human Use Committee reviews all protocols involving human subjects. WRAIR Policy Letters 914 (Procedures for the Review of Protocols Involving the Use of Humans as Volunteer Research Subjects) and 91-5 (Procedures for the Review of Protocols Involving the Use of Human Subjects for Which No Volunteer Agreement Affidavit is Required) are implemented in the review of all protocols requiring human subjects. These Policy Letters direct the review of all research protocols requiring human subjects in order to ensure the scientific merit of the proposed project and the protection of the rights and welfare of the human subjects.

The WRAIR Human Use Committee is a culturally diverse group of non-WRAIR government employees. In FY 1990, the Human Use Committee reviewed 8 new protocols, 20 continuing reports of active protocols, and 27 final reports. During this year, ad hoc in-house scientific review committees reviewed 53 new protocols of which the WRAIR Director approved 6 involving minimal risk. In FY 1991, the Human Use Committee reviewed 15 new protocols, 42 continuing reports of active protocols, and 25 final reports. Ad hoc in-house scientific review committees reviewed 48 new protocols, of which 6 minimal risk and 4 exempt protocols were approved. Ad hoc tri-service scientific review committees review retroviral research protocols. In FY 1990-1991, 45 retroviral human use protocols were reviewed. Human use protocols are tracked using a newly implemented data base (WRAIR, 1992).

2.8.3 Quality Assurance

The WRAIR Quality Assurance (QA) Committee oversees both the Human Use Committee and the LACUC and provides input regarding quality assurance and ethical issues. The QA Committee is composed of the WRAIR QA Coordinator for the Command a senior level veterinarian, a Health Science Administrator from the Office of Research Management, a senior Medical Service Corps officer, a senior Medical Corps officer, the WRAIR safety officer, WRAIR chemical hygiene officer, and a representative of the Subcommittee of Diagnostic Laboratories. The veterinarian on the committee is responsible for animal care and use and reviews all in-house animal use protocols. The Health Science Administrator coordinates the scientific and ethical review of WRAIR protocols requiring human subjects. The Medical Service Corps officer verifies credentials and privileges of investigators, health care providers, and the medical monitors of human use protocols (WRAIR, 1992).

The members of the WRAIR QA Committee meet at least quarterly, or as necessary to discuss QA issues, concerns, and problems. The Coordinator of the QA Committee prepares a quarterly report of meeting discussions. The Quarterly Report of the WRAIR QA Committee is distributed to the WRAIR Director and the USAMRDC QA Coordinator.

2.8.4 Accidents and Incidents

Accidents are reported Using CA Form 1 (Employee Notice of Traumatic Injury and Claim for Continuation of Pay/Compensation) and illnesses are reported using CA Form 2 (Employee Notice of Occupational Disease and Claim for Compensation). These forms are completed at the division or department level and accompany an individual reporting to the Occupational Health Clinic. A copy of the appropriate form is also filed with the WRAIR Safety Office. Accidents reported by WRAIR workers have been minimal and the WRAIR Safety Office has no records of laboratory-acquired infectious diseases in the past three years (Spencer, 1992). In calendar years 1990 and 1991, 86 injures were reported (pursuant to Public Law 91-595, Bureau of Labor Statistics, Log and Summary of Occupational Injuries and Illnesses), 15 of which resulted in days away from wore Thirty-one injuries have been reported for 1992 (January through October).

On September 1, 1989, there was a fire in Building 502, the microwave facility, located at WRAIR Forest Glen. The fire began in an experimental chamber, and although the cause of the fire was not precisely determined, the investigation pointed to a fire of electrical origin. All safety precautions had been followed (see Section 2.7.2.5). No negligence or equipment malfunction was found. Misunderstandings regarding the location of the fire and possible related hazards resulted in confusion and rumor at the scene of the fire. The fire was handled as a HAZMAT (hazardous materials) incident because of the possibility that microwave-absorbing polyurethane material lining the walls of the (closed) experimental chamber might generate hydrogen cyanide as a combustion by-product. This possibility also resulted in portions of the WRAIR Forest Glen and surrounding communities being evacuated and twenty one individuals were taken to the hospital for preventive decontamination (showers). None of these individuals were admitted and no follow-up care was necessary (WRAIR, 1989). Since the time of the accident, steps have been taken to assure better communication and improved emergency plans with local fire and emergency authorities. Replacement chambers are now fitted with non-polyurethane absorbing materials and a halon fire-suppression system.

An independent contractor conducted an environmental evaluation to determine the nature and extent of contamination resulting from the fire in Building 502 and appropriate clean-up measures. Sampling indicated the presence of asbestos, cyanide, and several organic compounds generated from the burning *of* plastics and laboratory chemicals. No chemical was found concentrations which posed a significant health risk. A Maryland- hazardous waste removal *firm* conducted a complete clean-up in accordance with all relevant state regulations.

2.8.5 Issues of Potential Concern

2.8.5.1 Building Safety

WRAIR Main (Building 40) dates, in part, from the mid 1920's. Building 40 consists of four attached buildings built in 1924, 1934, and 1962. Building 40 was originally designed for use as offices and/or classrooms. It has required much renovation and maintenance since the 1940's to accommodate research activities. In April, 1990, a major safety inspection was conducted by the U.S. Army Safety Center (USASC) in response to WRAIR's concerns regarding structural inadequacies at both WRAIR Main and WRAIR Forest Glen. In accordance with AR 385-10, the USASC reviewed WRAIR's safety, fire, and occupational safety and health components and identified fifteen deficiencies related to operations (Table 2-1) and facilities (Table 2-2).

Potential hazards at Building 40 were analyzed according to AR 385-10 which requires hazard analyses to determine the degree of risk and probability associated with identified hazards. Risks with the structural deficiencies of Building 40 (i.e., building upgrades and fire deficiencies) were rated by the USASC as catastrophic/probable. These deficiencies included the lack of a sprinkler system, stairways not enclosed to provide protected paths of escape to the outside of building, corridor doors which were not fire rated, inadequate compartmentalization, and an overtaxed electrical system.

To protect worker health and safety, WRAIR has prepared and is implementing an extensive Hazard Abatement Plan (WRAIR, 1990b). To partially mitigate potential hazards, in the interim until relocation to the New WRAIR, fire safety training was immediately implemented to enhance worker knowledge regarding the actions necessary to protect life and property in the event of a fire (Table 2-1). While these actions did not remedy the structural deficiencies, they did significantly reduce both the level of risk to workers should an emergency arise and the probability of occurrence (Rowley, 1992; Wall, 1992). Therefore, all fire hazards unrelated to the structural deficiencies of Building 40 have been addressed (Table 2-1).

Progress towards the remediation of structural deficiencies is detailed in Table 2-2. The WRAIR Hazard Abatement Plan addressed each point of concern raised in the USASC inspection and detailed the steps which have been, are, or will be, taken to abate all listed issues. According to AR 415-15, the installation of a sprinkler system in Building 40 is considered a Major Construction Activity (MCA) and must be programmed and budgeted five years in advance. A sprinkler system will not be installed in Building 40 because by 1997 the New WRAIR is expected to be operational. USASC evaluations made subsequent to the 1990 inspection determined that controls on the corrections to Building 40 such as the increased maintenance of electrical equipment, personnel use of personal appliances, and the use of extension cords significantly mitigated the severity and probability of fire. Items which still require mitigation are modifications to WRAIR Main's electrical distribution system (receptacles, junction boxes, wiring) and laboratory fume hood evaluation (Wall,

Table 2-1 WRAIR Safety Management Hazard Abatement Status

	Charles		Ī
DEMCIENCY	NOLLYCATION		
		IN PROGRESS PLANNED	7
No let	SAFETY PROGRAM		7
program.	WRAIR Safety Program (WRAIR Regulation 385-10) implemented (see Section 2.7.1).		
	ENVIRONMENTAL: SAPPTY		
Inadequate hazardous waste management plans.	WRAIR Safety Program (see Section 2.7.1), WRAIR CHP (see Sections 2.7.1 and 2.7.2.6), and WRAIR CHFMIN (see Section		
	2.7.2.6). Inspections implemented (see Section 2.7.7): Laboratory chief (continuous), Department Safety Officers (monthly), Post Headquarters WRAIR (annual).		
	SAFETY PROGRAM MANAGEMENT		
Lack of chemical safety training or chemical management.	WRAIR Safety Program (WRAIR 385-10) implemented (see Section 2.7.1). Chemical Hygiene Officer appointed. Training implemented (see Section 2.7.6). WRAIR CHP implemented (see Section 2.7.7): Laboratory chief (continuous), Department Safety Officers (monthly). Post Firm Market.		
	(semi-annually), Headquarters WRAIR (annual).		
Inadequate laboratory and fire safety training	Increased training implemented (see Section 2.7.6).		
Inadequate written safety and occupational health guidance	WRAIR Safety Program and WRAIR CHP implemented (see Sections 2.7.2 and 2.7.2.6).		
No system for emologies		•	
hazard reporting.	WKAIR Safety Program implemented (see Section 2.7.2). Dept. Chief monthly Safety Inspection Reports to WRAIR Safety		

Table 2-2 WRAIR Structural Deficiencies Hazard Abatement Status

	W	MITIGATION	
DEFICIENCY	COMPLETED	IN PROGRESS	PLANNED!
	MRE SAFETY		
No sprinkler system	Improved fire safety awareness. Equipment from halls removed. Smoking prohibited. Reduced use of extension cords. Improved chemical storage implemented.	•	•
Stairways not enclosed to protect path of escape.	Emergency lighting installed. Improved chemical storage procedures implemented.	•	Enclose stairways with approved enclosed stairwells.
Corridor doors not fire rated and fail to provide adequate compartmentalization	Improved chemical storage implemented. Increased fire inspections. Improved laboratory safety training implemented.	Improvements to sprinkler corridors are being designed.	Installation of approved fire doors.
	ENVIRONMENTAL SAFETY	LΥ	
Asbestos in unoccupied areas.	Exposed asbestos wrapped. Asbestos survey completed.	Removal being scheduled.	•
	ELECTRICAL SAFETY		
Inadequate wiring and electrical system.	Removed freezers and refrigerators. Reduced use of temporary wiring. Personnel use of personal appliances corrected. Reduction and improved use of extension cords.	Transformer sited for installation.	Survey Building 40 electrical system. Repair deficient electrical outlets.
	INDUSTRIAL, HYGIENE		
Defective chemical fame hood. Lack of evaluation and maintenance.	Defective chemical fume hoods not used. WRAIR Safety Program implemented (see Section 2.7.2). Monthly inspections by WRAIR Safety Office and WRAMC Health Physics.	•	Repair defective fume hoods.
	SAFETY AND OCCUPATIONAL HEALTH	HEALTH	
Building 511 HVAC and plumbing inadequacies.	Regular WRAIR Safety Office and Service Dept. Inspections have been implemented.	•	Improvements to HVAC and plumbing.
I Work orders submitted to WRAM	2)		

	NOLLOUIN		
DEFICIENCY	COMPLETED	IN PROGRESS PLA	PLANNED
	INDUSTRIAL HYGIENE		
Lack of employee feedback regarding personal exposure monitoring.	WRAIR Safety Officer now receives personnel exposure results and notifies employees.	,	
	OENERAL SAFETY		
Lack of adequate facility maintenance and housekeeping	Increased housekeeping awareness implemented at all levels.		
	SAFETY DURING ON-SITE CONSTRUCTION ACTIVITIES	TTIES	
No contractor oversight.	Contractual terms modified. Repair and renovation monitored by WRAIR Service Department.		•

1992). The move to the New WRAIR will fully mitigate hazards related to the structural conditions of the WRAIR Main, Building 40.

2.8.5.2 Animal Facilities

AR 70-18 (The Use of Animals in DoD and DoD-Sponsored Programs) requires all applicable DoD using animals to seek accreditation from the American Association for the Accreditation of Laboratory Animal Care (AAALAC), a non-federal, private, peer-review organization, and to conduct operations according to the standards and guidelines of the regulation. Animal handling practices and the quality of care at the WRAIR are not currently in accordance with the Guide for the Care and Use of Laboratory Animals, HHS Publication No. 86-23 (National Research Council, 1985) because of physical inadequacies in the buildings in which animals are housed. Concerns regarding WRAIR Forest Glen Building 511 (veterinary medicine facility) center around defective and inadequate environmental control systems and sanitation. Currently, conditions do not meet the minimum standards established by AAALAC.> Deficiencies include inadequate cage washing facilities, insufficient ventilation, undependable temperature and humidity control, a leaking roof, and obstructed sewage out flow in WRAIR Main, Building 40. The renovation or replacement of systems in WRAIR Forest Glen Buildings 511 and 512 would be necessary to attempt to meet certification requirements. The inadequacy of the current status of temperature, humidity, and air changes has been documented by monitoring data obtained by the Edstrom Environmental Monitoring and Security System located in Building 511 and Building 512. On January 17, 1990, 715 mice and 14 ferrets died and 250 mice had to be euthanized when temperatures in the WRAIR Main, Building 40 animal rooms reached 115 degrees Fahrenheit following a heating system malfunction (Hadick, 1990). The WRAIR does not use, and has no plans to use, threatened or endangered species in its research.

The September, 1991, semi-annual inspection of WRAIR animal facilities by the WRAIR LACUC reported that the facilities were not in compliance with the standards required by the Animal Welfare Act and U.S. Army regulations for the care of animals (WRAIR, 1992). To partially mitigate these deficiencies in the near-term, animal numbers have been reduced. Equipment to facilitate the housing of several species of animals under quarantine standards in the same room has been purchased.

Significant and extensive renovations to the current facilities, both at the WRAIR Forest Glen and at the WRAIR Main, are necessary to fully mitigate the deficiencies related to animal housing. Work orders for the upgrade of animal holding areas at WRAIR Main have been submitted. Major renovations to Building 511 and Building 512 (WRAIR Forest Glen) are scheduled. Renovation to Building 511 is scheduled to begin by November 30, 1992 and to be completed by June 30, 1994. During renovation the facility will be vacated and animals will be cared for in leased space. Renovation of Building 511 will include total replacement of the air handling system and plumbing.

3.0 ALTERNATIVES CONSIDERED

3.1 Identification of Reasonable Alternatives

The proposed action and subject of this EA is continuance of the WRAIR operations, at the existing facilities, in their present scope and size, until such time (expected to be in 1997) that WRAIR's operations are moved to a new building at Forest Glen, Maryland (Alternative IV). During preparation of this EA, three alternatives to the proposed action were identified. They included the continuance of WRAIR operations, at the existing facilities, in their present scope and size, into the distant future (Alternative the interim transfer of operations to a different location pending the move into the New WRAIR (Alternative II), and cessation of all operations presently performed at the WRAIR (Alternative III).

3.2 Range of Alternatives

An EA must identify and explain the "range of alternatives". The range of alternatives includes all reasonable alternatives, which must be rigorously explored and objectively evaluated, as well as those other alternatives, which are eliminated from detailed study with a brief discussion of the reasons for their elimination (40 CFR 1502.14(a).

3.3 Rejected Alternatives

After careful consideration, two identified alternatives were rejected as unreasonable. The reasons for their elimination are briefly discussed below. In accordance with 40 CFR 1502.14, these alternatives will not be explored or evaluated within the remainder of this EA

3.3.1 Rejected Alternative - Eliminate One or More Substances Utilized in WRAIR Research

This alternative encompasses the elimination of work wish: (i) etiologic agents (viable microorganisms, and their toxins, which cause or may cause human disease), (ii) hazardous chemicals, (iii) radioisotopes (radioactive substances) (iv) non-ionizing radiation (microwaves), and/or (v) GEMs.

Consistent with previous NEPA analyses performed by USAMRDC (BDRP FPEIS, 1989; USAMRICD, 1992), this alternative underwent a two-tiered analysis. First, the use of each substance was examined for the impact that its elimination would have upon the USAMRDC missions supported by the WRAIR operations. Second, each substance underwent an initial examination to determine the effect, positive or negative, that cessation of its use would have upon the environment. Consistent with USAMRDC's previous environmental analyses, if it was determined that cessation of the use of a substance would

both 1) render the USAMRDC missions supported by WRAIR operations ineffective, and 2) would not materially improve WRAIR's operation, reduce resource utilization, or reduce potentially adverse impacts, then an alternative based upon the elimination of one or more of the identified substances would be considered unreasonable.

Within the scope of this initial examination, each substance received close scrutiny under the two -tiered analysis. WRAIR's use of each substance is subject to the same safety, security, operational, and regulatory controls, present at other USAMRDC NEPA-evaluated operations (BDRP FPEIS, 1989; USAMRIID, 1991; USAMMDA, 1992; USAMRICD, 1992), which effectively mitigate, contain, and control the hazards associated with each substance's use. Consequently, it is concluded that elimination of the use of these substances would not materially improve WRAIR's operations, reduce resource utilization, or reduce potentially adverse impacts. Additionally, cessation of the use of these substances would render ineffective WRAIR's supporting role in USAMRDC's mission. Both tiers of the analysis having been met, an alternative based upon the elimination of the use of either of the identified substances was determined unreasonable for further consideration.

3.3.2 Rejected Alternative - Permanent Transfer of Operations to Another Location

This alternative entails continuing WRAIR's operations at a different and permanent location. Such a transfer could include continuing WRAIR's operations as an internal function through the construction of a new facility or facilities, or the purchase or lease of an existing facility or facilities, in the same, or in a new, geographical location. A transfer could also be accomplished by making WRAIR's operations an extramural USAMRDC function, accomplished through contracts with private industry and/or academia This alternative was considered reasonable for review in previous USAMRDC NEPA documents (USAMMDA, 1992; USAMRICD, 1992).

Circumstances unique to the WRAIR render the Transfer Alternative unreasonable within the context of this EA. An earlier EA examining the future needs of the WRAIR concluded that a new WRAIR facility should be constructed (The New WRAIR EA). Major Construction funding has been appropriated and construction is to commence at Forest Glen, Maryland, in the spring of 1993. The *New WRAIR* EA, which culminated in a Finding of No Significant Impact, examined several alternatives, to include many of the transfer alternatives identified herein. In fact, it may be said that the decision to construct a New *WRAIR* was a decision to implement an aspect of the Transfer Alternative.

Because the environmental evaluation in the New WRAIR EA included the several transfer alternatives, the Permanent Transfer Alternative is repetitive of earlier NEPA analysis. Neither NEPA nor CEQ regulations envision the reexamination of earlier environmental documents having conclusions and decisions which both remain current and are compliance with NEPA. Consequently, the Permanent Transfer Alternative, which

was previously evaluated, and *which* was effectuated through the decision to construct and operate the New WRAIR, is unreasonable for consideration in the context of this EA

3.3.3 Other Than Full Rejection

It must be noted that although the rejected alternatives will not be further considered independently, both are included as part of the No Action Alternative (Alternative III). Consequently, should this EA determine that WRAIR's use of an identified substance results in an unmitigatable significant adverse environmental impact that will continue until the move and/or after the move into the New WRAIR (rejected alternative 33.1), or that any part of WRAIR's operations results in an unmitigatable significant environmental impact that will continue until the move into the New WRAIR (rejected alternative 3.3.2 then the No Action (cease WRAIR operations) Alternative becomes paramount. Upon identification of an unmitigatable significant adverse environmental impact, USAMRDC will be limited to the exercise of two options. First, USAMRDC may cease WRAIR's operations (or those portions of WRAIR's operations generating the impact) pending completion of the New WRAIR and/or after its completion should an impact remain. Alternatively, the USAMRDC may prepare an EIS and either cease WRAIR operations (or the impacting portions of WRAIR operations) or continue those operations regardless of the impact.

3.4 Reasonable Alternatives

The four alternatives that encompass the range of reasonable alternatives examined within this EA follow:

3.4.1 Alternative I - Continuance of WRAIR Operations, at the Existing Facilities, in Their Present Scope and Size, Into the Distant Future

This alternative entails the continuance of WRAIR operations, as identified in Section 2.0, in the facilities at the WRAIR Main and the WRAIR Forest Glen. Under this alternative, the scheduled mitigation measures (see Section 2.85.1) would be completed and occupancy and operations of the WRAIR Main and the WRAIR Forest Glen would continue indefinitely.

WRAIR's mission can be more efficiently and effectively achieved in a modernized facility, such as the proposed New WRAIR, that incorporates the operations presently conducted at the two existing facilities. The present WRAIR facilities can be modernized through renovation, but at a cost estimated in excess of the cost to build the New WRAIR (WRAIR, 1991). The New WRAIR previously underwent an environmental analysis which resulted in a Finding of No Significant Impact. For these reasons, modernizing the present facilities for use into the distant future is not the preferred alternative. It is noted that this alternative is tantamount to the reexamination of the conclusions and decision of a previous NEPA document (The New WRAIR EA), and that the Transfer Alternative was, in part, rejected as unreasonable because it would require reexamination. USAMRDC distinguishes

its rejection of by concluding that remaining at one's present location, like the No Action (cease operations) Alternative, is, by its nature, always ripe for consideration.

3.4.2 Alternative II - Temporary Transfer of Operations to Another Location

This alternative entails continuing WRAIR's operations, on an interim basis (until the New WRAIR becomes operational), at a different location. Such a transfer could include continuing WRAIR's operations as an internal function through the construction of a *new* facility or facilities, or the purchase or lease of an existing facility or facilities, in the same, or in a new, geographical location. A transfer could also be accomplished by making WRAIR's operations an extramural USAMRDC function, accomplished through contracts with private industry or academia

The decision being made, in compliance with NEPA, to construct and operate the New WRAIR to include appropriations expenditures to move operations to the New WRAIR, it is simply not economical to expend additional money on an interim transfer. Likewise, an interim move, in addition to the New WRAIR transfer, is an inefficient utilization of human resources (administrative, logistical, and otherwise), and will only add to the down-time when research in support of the WRAIR mission is not accomplished. For these reasons, the interim transfer of WRAIR operations is not the preferred alternative.

3.4.3 Alternative m - No Action (Cease Operations) Alternative

This alternative contemplates cessation of operations presently performed at the WRAIR

Because cessation of WRAIR operations would eliminate WRAIR's continuation to the national defense posture, this alternative is not preferred This alternative is, nevertheless, ripe for consideration should an unmitigatable significant adverse environmental impact be identified ninth WRAIR's present and/or future (to include at the New WRAIR) operations

3.4.4 Alternative IV Continuance of the WRIER Operations, at the Existing Facilities,, Pending Move to the New WRAIR

This action contemplates continuance of WRAIR operations, at the existing facilities, in their present scope and size, until such time (expected to be in 1991) that WRAIR's operations are moved to a new building at Forest Glen, Maryland. Under this alternative, the coordinated mitigation measures described in Section 2.85.1 would be completed, and operations would continue at the present locations until the New WRAIR is operational.

The consolidation of the operations presently performed in the several WRAIR facilities into one modernized facility is expected to enhance the efficiency and economy of

WRAIR's work product. The New WRAIR is cost-efficient to build (WRAIR, 1991), will enable WRAIR to make a greater contribution to the national defense posture (due to gains in efficiency and economy), and will not significantly adversely impact upon the environment ('I he New WRAIR EA). For these reasons, continuance of operations at the WRAIR, and the eventual move into the New WRAIR, is the preferred alternative.

4.0 AFFECTED ENVIRONMENT

4.1 Introduction

This section of the EA describes those aspects of the biophysical and socioeconomic environment that could be affected by the continuation of operations of the WRAIR. As discussed in Section 5.0, little probability exists that continuance of operations at the WRAIR will have a significant negative impact on any environmental component.

4.2 Environmental Setting

The general settings of the WRAIR Main and the WRAIR Forest Glen are urban. In the context of this EA, all research activities of the WRAIR are located within the respective facility complexes in Washington, DC (WRAIR Main), and Forest Glen, Maryland (WRAIR Forest Glen). The WRAIR Main is located on the grounds of the WRAMC which is situated on approximately 114 acres in northern Washington, DC (Figure 2 -1). The WRAIR has been a tenant activity of the WRAMC since 1925 (Environmental Science & Engineering, 1984). It currently occupies space at the WRAMC in Buildings 40, 189, 500, 501, 502, 503, 504, 505, 506, 507, 508, 511, 512, and 101.

The WRAIR Forest Glen is located on 182.53 acres of land in the Silver Spring area of Montgomery County, Maryland, and about three miles north of the WRAIR Main (Figure 401). North of the WRAIR Forest Glen is the Capital Beltway, and the CSX Railroad and Brookeville Road are located to the east. Access to the WRAIR Forest Glen is possible via Forest Glen Road, Linden Lane, and Brookeville Road. Rock Creek Park and Forest Glen neighborhoods are located to the west of the facility and the Lytonsville Urban Renewal area is located to the south.

4.2.1 Land Use

The existing land use patterns at the WRAIR Main and the WRAIR Forest Glen conform to the current and future plans for development within Washington, DC, and Montgomery County, Maryland (Montgomery County Planning Board/The Maryland National Capital Park and Planning Commission, 1991; The New WRAIR EA). The WRAIR Main is bounded by 16th Street, Alaska Avenue, Georgia Avenue, Fern Street, and Aspen Street. This urban area consists of both residential and commercial (retail) properties.

Land use within the vicinity of the WRAIR Forest Glen is regulated by Montgomery County and conforms to the current and future plans for development within Montgomery County, Maryland. The county maintains a Comprehensive Plan, establishes zoning ordinances, and regulates development on lands within its jurisdiction. Development in the community surrounding the WRAIR Forest Glen consists of commercial and residential

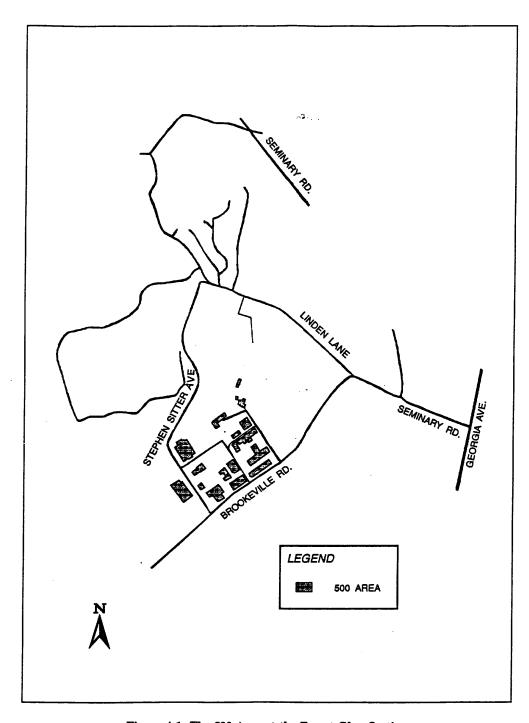


Figure 4-1 The 500 Area at the Forest Glen Section

areas (Figure 4-2). Land immediately to the east and south of the WRAIR Forest Glen (along the railroad and Brookeville Road) is zoned for light industry and commercial. The businesses currently in this area include warehouses, auto repair, offices, and commercial uses. Just beyond these industrial areas, land is zoned for single and multi-family residences (The New WRAIR EA).

4.2.2 Plant and Animal Ecology

The distribution and abundance of wildlife within a geographical area are dependent upon soil type and quality, availability of vegetation and shelter, and human land use patterns (see Section 4.23). Both the WRAIR Main and the WRAIR Forest Glen are located in the oak -chestnut region of the Piedmont Plateau physiographic province. Tree species characteristic of this region are the white oak (Quercus alba), black oak (Q. fluting), tulip tree (Liriodendron tulipifera), smoothbark hickory (Carve sp.), chestnut oak (Q. Prinus), scarlet oak (Q. coccinea), scrub pine (Pinus virginiana), and pitch pine (P. rigida) (U.S. Army Environmental Hygiene Agency, 1976). A list of wildlife species potentially found in the northern portion of Washington, DC, and Montgomery County is provided in Appendix F. A more detailed discussion of the plant and animal ecology of the region may be found in CH2M Hill (1979).

Most of the native vegetation of Washington, DC has been destroyed or highly altered because of urbanization. The WRAIR Main is located in a well established urban area and thus provides only minimal habitat for wildlife with the possible exception of **nesting** areas for birds adapted to heavily populated areas. There are no surface waters or wetlands near the WRAIR Main. The wetland nearest to the installation is approximately one mile to the east (U.S. Fish and Wildlife Service, 1981). Therefore, there is no habitat to support fish or other aquatic communities.

The woodland areas of Montgomery County are populated with hardwoods and conifers, grasses, legumes, and other wild herbaceous plants. These areas provide habitat for many species including squirrels, chipmunks, and other small mammals as well as a variety of bird species. The WRAIR Forest Glen is located immediately to the east of Rock Creek Park The Maryland portion of the Rock Creek watershed is inhabited by at least 30 species of mammals and 47 species of amphibians and reptiles (see Appendix F).

The Montgomery County wetlands habitats provide potential food and shelter for ducks, geese, herons, shore birds, muskrat, mink, and beaver. These open, shallow water areas may be marsh or swamplike and contain numerous species of annual and perennial herbaceous plants.

Although periods of precipitation may result in the filling of stream beds, the surface waters near the WRAIR Forest Glen provide only marginal habitat for fish or other aquatic communities because the streams receive drainage from urban watersheds. The Forest Glen Section has an area of about 12 acres maintained as "improved open spaces which consists

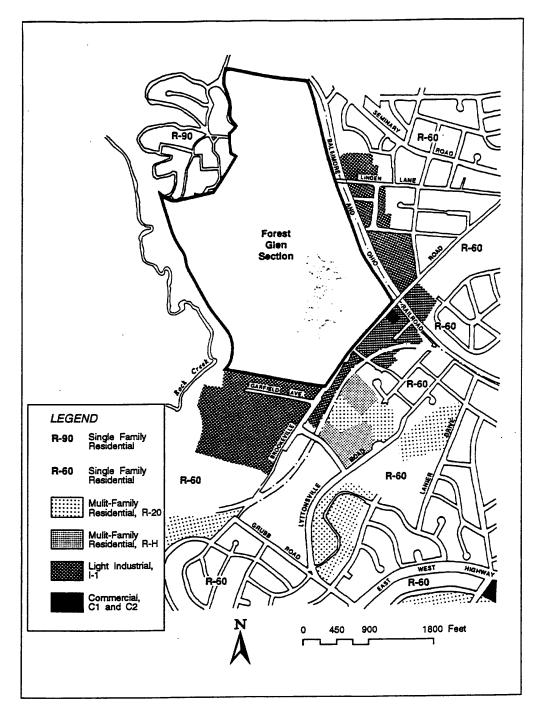


Figure 4-2 Land Use in the Vicinity of the Forest Glen Section

of trees and ground cover (Figure Therefore, the WRAIR Forest Glen provides limited habitat for birds, mammals, reptiles, and amphibians adapted to urban conditions.

The WRAIR does not use rare or endangered animal species in their research activities. Several threatened and endangered species inhabit portions of Montgomery County (Appendix F) (The New WRAIR EA). The majority of these species are dependent on large wetlands and undisturbed habitat. The bald eagle (Haliaeetus cephalus) may use the habitat found in Montgomery County during migration. Bald eagles are associated with timberland near streams. Despite the suitability of habitat, it is not known to frequent the area near the WRAIR Forest Glen.

Field surveys were conducted in 1989 and 1990 to identify the presence of habitats for rare, threatened, and endangered species near the WRAIR Forest Glen. These studies identified potential habitats near the WRAIR Forest Glen for Hay's Spring amphipod (*Stygobromus hayi*), an animal which normally dwells underground but may come to the soil surface when groundwater levels are high or soils become waterlogged. This aquatic insect is listed as a federally endangered animal. Hay's Spring amphipod was not recorded for stream habitats near the WRAIR Forest Glen. The surveys were conducted during optimal conditions for the insect. The Maryland Department of Natural Resources (MDNR) also performed an ecological survey near the WRAIR Forest Glen and concluded that rare, threatened, and endangered species or critical habitats were absent from the property (The New WRAIR EA). Given the altered environment characteristics of the area near the WRAIR Forest Glen, there is little high quality habitat for most species of wildlife. Consequently, no known critical habitats are located on or adjacent to the WRAIR Forest Glen.

4.2.3 Geology

Montgomery County and Washington, DC, are geologically divided by Rock Creek into the Piedmont Province (west) and the Coastal Plain Province (east) (Maryland Office of Environmental Programs, 1986). The WRAIR Main and the WRAIR Forest Glen lie east of Rock Creek (Soil Conservation Service, 1990a). The Piedmont Plateau is characterized by exposed metamorphic rocks, hilly to rolling terrain, and fast flowing streams. Major rock types include schist, medium-grained gneiss, biotite gneiss, and dio rite (Soil Conservation Service, 1990b).

The WRAIR Main is located in Washington, DC, in the extreme eastern portion of the Piedmont Plateau physiographic province (Appalachian Highlands). The site is characterized by rolling hills varying in elevation from 74 meters to 107 meters above mean sea level (U.S. Army Environmental Hygiene Agency, 1976). The land use patterns at the site (building and parking areas) result in generally Bat terrain with a slight overall slope towards the south-southwest and the Rock Creek drainage system. Slopes average approximately 10 percent. Soils in the District of Columbia are primarily derived from Piedmont rocks and unconsolidated Coastal Plain sediment. The two predominate soil

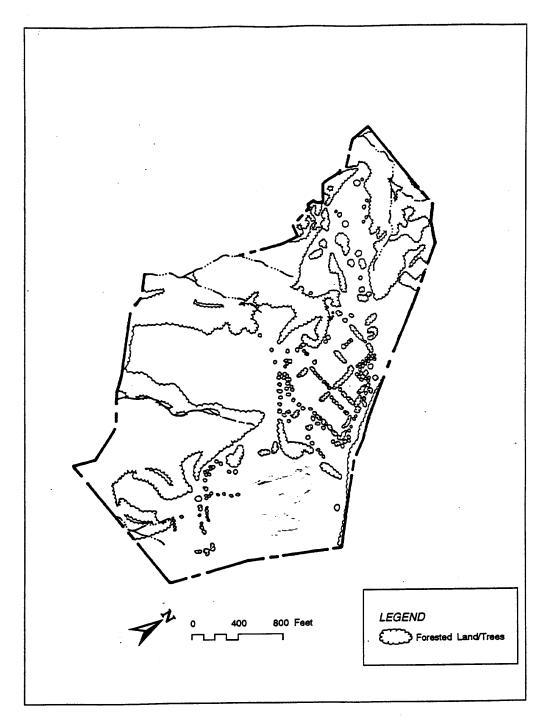


Figure 4-3 Distribution of Wooded Areas on the Forest Glen Section

complex types near the WRAIR Main are Urban Land Manor Complex (60%) and Urban Land Chillum (27%). The remainder of the site (13%) includes Urban L and, Udorthents, and Glenelg Variant -Urban complex (Soil Conversation Service, 1976).

The WRAIR Forest Glen is also located in the eastern portion of the Piedmont Plateau physiographic province (Appalachian Highlands). Elevations near the WRAIR Forest Glen in Montgomery County range from 107 meters to 119 meters above mean sea level. The land use patterns near the WRAIR Forest Glen result in generally flat terrain with a slight overall slope towards the south -southwest and the Rock Creek Drainage system. The slope near the WRAIR Forest Glen averages nearly 15 percent with slopes greater than 50 percent near stream beds.

Three soil series predominate in the area near the WRAIR Forest Glen. These series are the Brandywine Loam (approximately 28%), Glenelg Silt Loam (approximately 28%), and the Manor -Channery silt loam (approximately 28%). Glenville and Wehadkee silt loams make up the remaining soil. The majority of the WRAIR Forest Glen is underlain by the Manor -Channery Silt Loam soil type (The New WRAIR EA) (Figure 44). This soil is considered to be silty loam and is found in 8 to 15 percent slopes (Soil Conservation Service, 1976). Permeability and available water capacity for this soil are low to moderate. The water table is more than six feet beneath the soil surface. Water generally percolates well through this soil type (Soil Conservation Service, 1990b). The suitability of the Manor Channery silt loam soil type for agricultural purposes is poor. The potential of these soil types to support grasses, herbaceous plants, hardwood trees, coniferous plants and associated wildlife, and wetland plants and associated wildlife are poor (Soil Conservation Service, 1976).

Three sites near the WRAIR Forest Glen were formerly used as unregulated landfills (Figure Dumping began prior to 1955 and included at least construction debris. These landfills may also contain small quantities of hazardous, radioactive, and medical wastes (The New WRAIR EA). The soils in the landfill areas were analyzed as part of the site characterization study for the New WRAIR. This study indicated that the soils contained elevated levels of some volatile and semi-volatile organic compounds and asbestos when compared to background samples (Argonne National Laboratory, 1990).

4.2.4 Water

4.2.4.1 Surface Water

Both the WRAIR Main and the WRAIR Forest Glen are within the Rock Creek Drainage Basin. This major stream drains the entire region with nearly all smaller streams eventually emptying into it (CH2M Hill, 1979). Rock Creek originates in Montgomery County north of the WRAIR Forest Glen. The creek flows along the western boundary of the WRAIR Forest Glen and terminates in the Potomac River about five miles south of the WRAIR Forest Glen.

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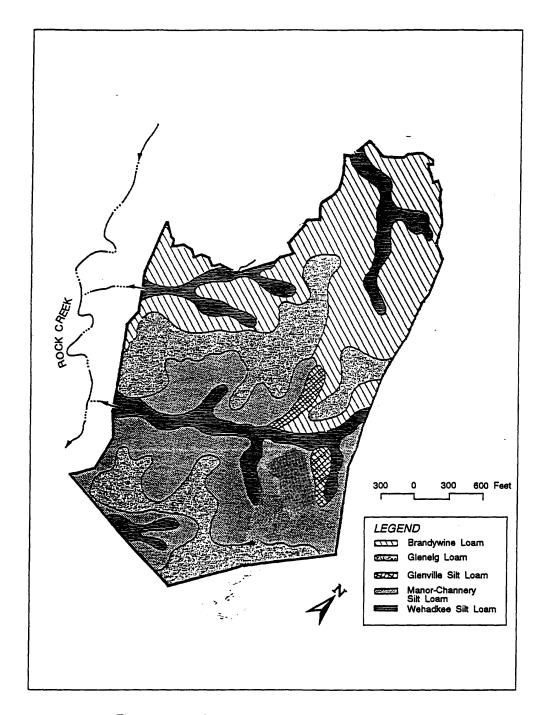


Figure 4-4 Soil Types Present at the Forest Glen Section

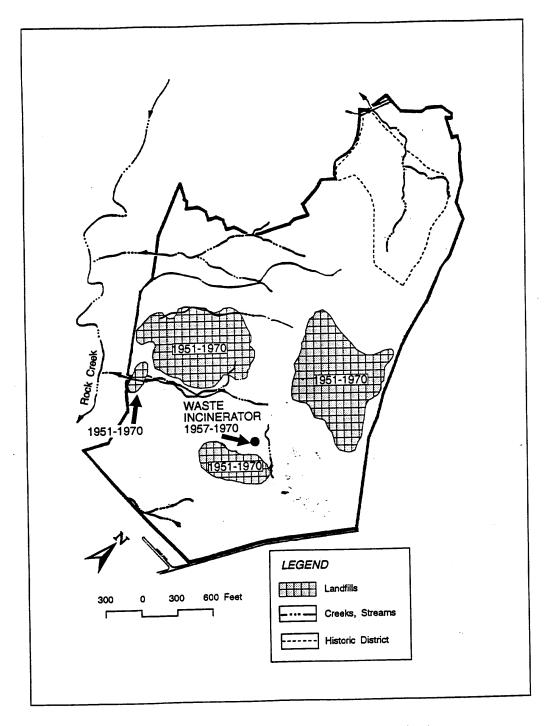


Figure 4-5 Former Landfill Sites at the Forest Glen Section

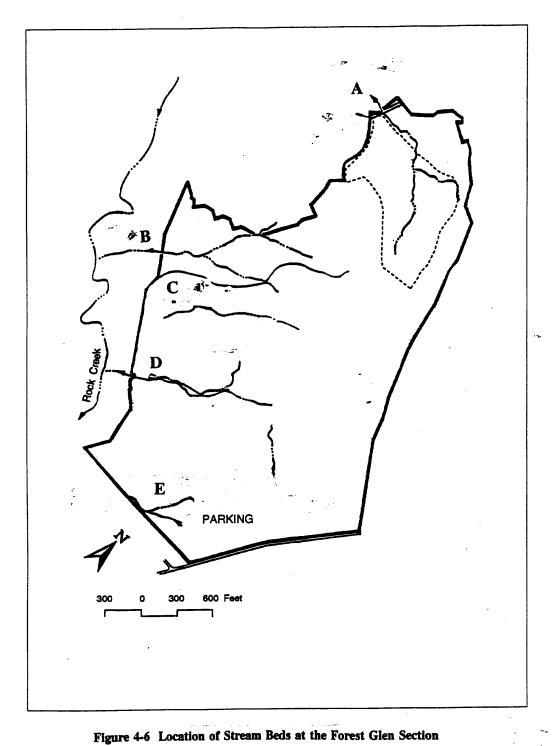
Surface water from the WRAIR Main arising from precipitation drains through the WRAMC storm sewer system ("the Luzon tunnel, 2.44 by 1.67 meters, a tunnel which runs under the post from the intersection of Dahlia Street and Georgia Avenue to Rock Creek Park off the southwestern corner)') (Environmental Science & Engineering, 1984) and eventually through the Washington, DC, storm sewer system.

Five stream beds, ranging in width from 10 to 20 feet, have been identified near the WRAIR Forest Glen (Figure 4-6). Accumulated precipitation drains into these stream beds or into Rock Creek Examination of these stream corridors for the existence of seeps or springs was negative (U.S. Army Corps of Engineers 1990). The five streams located near the WRAIR Forest Glen have a Use I designation conferred by the Maryland Department of Natural Resources (COMAR 26.08.02). This classification is given to free -flowing non- streams which are suitable only for recreational uses. Neither Montgomery County nor the Metropolitan Washington Council of Governments (MWCOG) Potomac Regional Monitoring Program monitors the water quality of these streams. Rock Creek is sampled by the MWCOG at a point about 11 miles downstream from the WRAIR Forest Glen (The New WRAIR EA). Rock Creek is classified as Use II and Use III and must maintain water quality standards which support trout. Such waters are designated, respectively, as Recreational Trout Waters and Natural Trout Waters (COMAR 26.08.02).

The depths of these streams vary from completely dry to approximately eight inches. The streams range from 10 to 20 feet across. Two of the streams, Stream A and Stream D (South Ireland Creek), are likely perennial streams based on the visual characteristics of the stream beds and the associated vegetation. Streams B. C, and E contain less water and are intermittently dry (The New WRAIR EA). There is not a U.S. Geological Survey (USGS) gauging station in Rock Creek near the WRAIR Forest Glen. The average discharge for the last fifty years 3.4 miles downstream from the site is 623 cubic feet per second (cfs). The flow at this station has ranged from 05 cfs to 12,500 cfs during the same tune period.

The five streams located near the WRAIR Forest Glen drain upland areas and receive drainage from natural sources and storm sewers. Streams A D, and E receive flow from storm sewers. Significant erosion and siltation has occurred in and around Stream D because of diversion through culverts and the large area of impervious, paved surfaces in its drainage. An area identified as a 100 -year flood plain by the National Flood Insurance Program is located in a small area downstream of Stream D along the western border of the base (Figure (The New WRAIR EA).

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory map indicates that numerous wetland habitats are present within several miles of the WRAIR Forest Glen but does not indicate the presence of wetlands on the base (U.S. Fish and Wildlife Service, 1991). A field survey conducted in 1989, however, identified bands of wetlands ranging from 30 feet to 70 feet wide associated with all five stream corridors (The New WRAIR EA). These wetlands were occupied by facultative plant species (found in wetlands and upland areas) and were underlain by hydric soils.



4.2.4.2 Groundwater

Both the WRAIR Main and the WRAIR Forest Glen lie above the Piedmont Hard Rock Formation (Maryland Office of Environmental Programs, 1986). These formations contain the most productive hard rock aquifers in the state. Approximately 20 percent of these formations may be expected to yield 50 gallons per minute or more of water. In general, the quality of the groundwater of the Piedmont Hard Rock Formation is good. Geologically, these formations are fractured non calcareous rocks. Since the fractures are not extensively interconnected, the potential for groundwater contamination is moderate. Any contamination is likely to be localized (Maryland Office of Environmental Programs, 1986). More productive aquifers are located to the south and southeast of the WRAIR Main and the WRAIR Forest Glen. These coastal aquifers include the Patuxent, Patapsco, and Magothy aquifers and their respective recharge areas.

Because of the character of the bedrock on which the WRAIR Main and the WRAIR Forest Glen are situated, it does not provide a useable aquifer for supply of drinking water. The well nearest to either WRAIR Main or WRAIR Forest Glen is part of the Maryland Geological Survey's Observation-Well Network and is located in Fairland, Maryland (well number MOEh20). Water in this well has ranged from 4.4 to 16.4 feet below land surface with usual levels - ranging from 10 to 15 feet below land surface during 31 years of monitoring (1955-1986). There is no evidence that seeps or springs are present near the WRAIR Forest Glen (The New WRAIR EA).

The groundwater resources at the WRAIR Forest Glen have been evaluated as part of the site characterization study at the site of the proposed construction. Data from these monitoring wells and soil borings indicate the shallowest groundwater is located 17 feet below land surface. Groundwater was located at depths ranging from 10 to 50 feet into the weathered bedrock (The New WRAIR EA). The Groundwater under the WRAIR Forest Glen contains slightly elevated levels of some inorganic compounds. These substances have likely been leached from the landfills (Argonne National Laboratory, 1990)

4.2.5 Air Quality

The air quality of the Washington metropolitan region is regulated by MDE Air Management Administration. The WRAIR Main and the WRAIR Forest Glen are located in Maryland Air Quality Control Area IV (Washington Metropolitan Area) and includes Montgomery County and Prince Georges County. The National Ambient Air Quality Standards (NAAQS) are incorporated into the standards set by the state agency. The State of Maryland incorporates the air quality standards implemented pursuant to the Clean Air Act Citations include 40 CFR Parts 50, 51, 52, 57, 60, 61, 80, and 82. Subjects covered include ambient standards, new stationary sources, hazardous pollutants and related topics.

The air quality of the Washington metropolitan area including Montgomery County is generally good. A lack of large industrial point sources within the region is the principal

reason for the current air quality. Vehicular emissions are the major air pollutants in Montgomery County. Since 1985, ozone levels have periodically exceeded state standards. Pursuant to the Clean Air Act of 1990, the Washington metropolitan area (including Montgomery County) was reclassified by the EPA as a serious non-attainment area for ozone because concentrations frequently exceed the NAAQS during warm weather months. Other monitored air pollutants have remained below standards set by the State of Maryland (Maryland Department of the Environment, 1989).

4.2.6 Agriculture

Agricultural and mining services are the smallest employment sectors of the economy of Montgomery County. A total of 3,475 people were employed in these activities and represented 0.8 percent of the county's jobs in 1988. Approximately 101,875 acres of Montgomery County are used for agriculture. Most of the agricultural activity in Montgomery County is confined to landscaping and horticultural services (Maryland - Capital Park and Planning Commission/Montgomery County Planning Department 1991b).

4.2.7 Cultural Resources

4.2.7.1 Historical

A cultural resources study in compliance with Section 106 of the National Historic Preservation Act of 1966 (as amended in 1980) was conducted in 1990 for the U.S. Army Corps of Engineers. This investigation identified potential historic architectural and archaeological resources at the WRAIR Main and the WRAIR Forest Glen (Kise Franks & Straw 1990a, 1990b). The collection of the Army Medical Museum is the only historic, resource located near the WRAIR Main. The museum's collection was given the status of a National Historical Landmark (NHL) in 1965 (Kise Franks Straw, 1990a). Ellis study did identity a potential National Register -eligible historic district at the WRAMC in Washington DC, which includes the entire installation with the exception of the area north of Dahlia Street and east of 14th Street. Contributing resources to this proposed district include numerous buildings and landscape features (US Army Corps of Engineers, 1990a).

The Section 106 investigation of the area near the WRAIR Forest Glen evaluated resources which are potentially eligible to be listed in the National Register of Historic Places (Table 41). These buildings were determined not to possess architectural or historical significance, either singularly or collectively. This investigation identified the National Park Seminary Historic District as a potential resource (Figure A detailed history of this property is available in Kise Franks & Straw, 1 1990 b. The land where the WRAIR Forest Glen is located was purchased by the Army in 1942 to serve as a convalescent center for Walter Reed patients. The 170 -acre property was at that time a junior college and preparatory school for girls (National Park Seminary). Since 1946, the area near the WRAIR Forest Glen has been used for additional purposes. The National

Table 4-1 Historical Resources Evaluated near the WRAIR Forest Glen

Building	Use	Age	
148	Log cabin	c. 1800	
152	Rear shed to dairy barn	c. 1940	
154	Shed	c. 1910	
155	Animal shed	c. 1910	
156	Dairy barn	c. 1910	
•	Picnic house	c. 1930	

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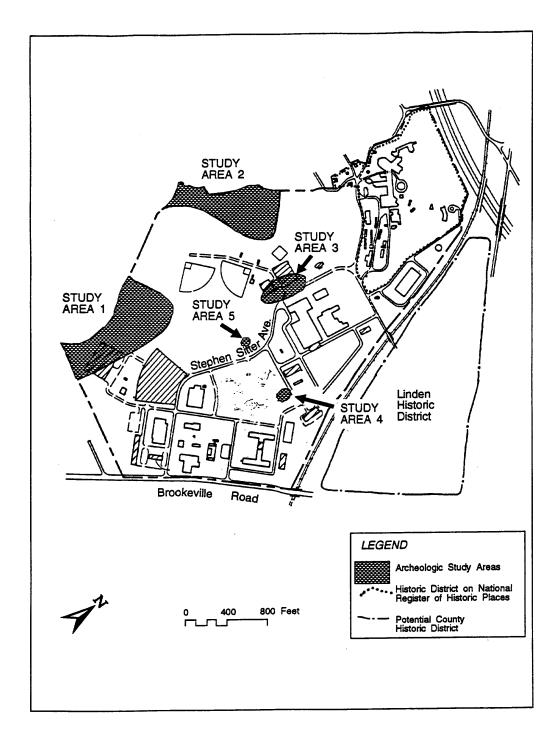


Figure 4-7 Archaeologic Study Areas and the Historic District at the Forest Glen Section

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Park Seminary is the only historic resource near the WRAIR Forest Glen (located approximately 1,200 feet to the northeast of the 500 area). Further investigation concluded that other historic structures at Forest Glen were not eligible for the Register. The National Park Seminary is in a state of serious deterioration.

4.2.7.2 Archaeological

A search of existing resources revealed no known archaeological sites within the WRAMC in Washington, DC, and site examinations concluded that there was "no chance" that preserved archaeological resources are located at this site because of its history of development and land use patterns (Kise Franks & Straw, 1990a). No sites of archaeological importance have been uncovered at the WRAIR Forest Glen in the course of past construction and maintenance activities. A Phase I archaeological survey has been performed near the WRAIR Forest Glen (Figure 4-7). This study concluded only soils under the log cabin (#148) may reasonably contain significant archaeological remains (Kise Franks & Straw, 1990b). The degree of surface erosion, overall slope of the terrain, and soil disturbances at the WRAIR Forest Glen indicate that there is little possibility for most of the site to contain significant archaeological deposits.

4.2.8 Climate

Climatic conditions in the Washington metropolitan area are influenced by its proximity to the Chesapeake Bay and the Atlantic Ocean which are east of the site and the Appalachian Mountains which are to the west. Maritime tropical winds from the south and southwest bring warm humid air in the summer. Mean monthly temperatures range from 1.7 degrees Centigrade in January to 25.9 degrees Centigrade in July. Average precipitation ranges from 5.76 centimeters (cm) in January to 11.98 cm in August. The average annual precipitation for the region is 90.85 cm and the average annual snowfall is 50 cm.

Prevailing winds arise from the northwest in the winter months and from the South throughout the other seasons. Mean monthly wind speeds are 3.7 meters/second in July and 5.0 meters/second in March. The annual mean wind speed is 4.2 meters/second (U.S. Army Environmental Hygiene Agency, 1976). Often high -pressure systems stall over the area during the summer and cause poor air quality. In the winter, continental -polar winds from the west and the northwest create cold, dry conditions.

4.2.9 Energy Resources

Depletable resources consumed by the WRAIR Main and the WRAIR Forest Glen include natural gas and fuel oil.

4.2.10 Sociological

In 1990, the Washington, DC, metropolitan area had a total population of 3,924,000. In 1990, the population of Washington, DC, was 607,000. The population in the Washington, DC, metropolitan area grew 20.7 percent between 1980 and 1990, while the population of the Washington, DC, proper decreased by 4.4 percent. Proportions of the Washington, DC, population by race in 1990 were approximately 66 percent Black, 30 percent White, and 4 percent Other (U.S. Department of Commerce, 1991). Thirty-three percent of the Washington, DC, population 25 years of age or older have completed at least four years of college (Levy 1992). There were 250,000 occupied housing units in Washington, DC, in 1990, with 2.43 persons per unit (U.S. Department of Commerce, 1991).

Montgomery County had a reported 1990 population of 757,027 and a 1980 population of 579,023. Proportions of *the* population by race in 1990 were approximately 77 percent White, 11 percent Black and 11 percent Other. The 1990 population represents an increase of more than 30 percent since 1980. The population in 2000 is projected to be 807,000. The median age for the county is 33.9 years. Fifty-six percent of the residents of Montgomery County 25 years of age or older have completed at least four years of college. The number of households reported in 1990 was 282,228. Greater than 55 percent of the households in Montgomery County have either one or two occupants (Maryland-National Capital Park and Planning Commission, 1991a; Maryland -National Capital Park and Planning Commission, 1991b).

The WRAIR Forest Glen is located in the northwest portion of Planning Area (PA) #36 of Montgomery County. This area of Montgomery County has experienced little population growth since 1980 compared to the rest of the county. The estimated population of PA#36 in 1980 was approximately 3O,000 and increased to only 30,254 in 1987. PA#36 contains Silver Spring which has little land available for new residential units because it has been fully developed for many years.

4.2.11 Noise

The sites of the WRAIR Main and the WRAIR Forest Glen are relatively quiet. Off -site noise from sources contribute more to the general noise level than noises generated on -site. Sources of noise from off-site include vehicular traffic from surrounding streets such as Georgia Avenue and the Capital Beltway and infrequent landings at the helicopter pad near the WRAIR Forest Glen. Railroad noise generated by the CSX Rail System running along the eastern edge of the installation also contributes to on -site noise levels

4.2.12 Odors

Research activities at the WRAIR require that waste material be rendered sterile through heat treatment and incineration. This material includes contaminated laboratory materials, animal remains, and wastewater. While steam heating and incineration provide

effective treatment and disposal of infectious waste, associated odors may be transiently offensive. These odors are localized in area and time, and are rapidly dispersed in the ambient atmosphere. There are no records of complaints of offensive odors from the WRAIR originating from either WRAIR Main or the incinerator at the WRAIR Forest Glen (see Section 2.733).

4.2.13 Economic Environment

4.2.13.1 Employment

In 1990, approximately 303,300 citizens of Washington, DC, 16 years of age or older were employed. Approximately 30 percent of these individuals were employed by federal, state, or local government (Levy, 1992). The 1990 unemployment rate for Washington, DC, 5.0 percent (U.S Department of Commerce, 1991).

According to the Maryland Office of Planning, the number of employed persons in Montgomery County during March 1989 was 437,700 and increased to 455,000 by March 1990. The unemployment rate was 3.1 percent. During this period approximately 26 percent of the workforce was employed by government institutions. Nearly 59 percent of the employed residents of Montgomery County work within the county (Maryland Office of Planning, 1990).

4.2.13.2 Income

In 1989, the annual average pay for persons employed in Washington, DC, and the Washington, DC, metropolitan area, respectively, were \$ 32,106 and \$ 28,102 (U.S. Department of Commerce, 1991). The 1990 median household income in Washington, DC, was \$ 30,727 and the per capita income was \$ 18,881 (Levy, 1992).

The total personal income in Montgomery County in 1989 was \$ 19.6 billion. The per capita income was just under \$ 28,000. The median household income was \$ 60,586 in 1990 (Maryland Office of Planning, 1990; Maryland-National Capital Park and Planning Commission, 1991a).

4.2.13.3 Property Values

In 1990, there were 250,000 occupied housing units in Washington, DC (U.S. Department of Commerce, 1991). The median price for a owner-occupied single-family home was \$ 121,700 (Levy, 1992).

In 1990 there were 282,228 housing units in Montgomery County. The median price for a single -family home in 1989 was \$ 166,500 (Maryland Office of Planning 1990).

4.2.14 Public Opinion

Major issues of public concern at the local level relate to traffic mitigation preservation of the Historic District at Forest Glen.

4.2.15 Transportation

4.2.15.1 Traffic

The transportation needs of the WRAIR Main and the WRAIR Forest Glen are served adequately by existing road systems. However, because of the location within the metropolitan Washington area, congestion is a problem and traffic mitigation programs are an official growth policy of the region (Montgomery County Council, 1991; Montgomery County Planning Board/The Maryland -National Capital Park and Planning Commission, 1991).

Regional access to the WRAIR Forest Glen from the north is available on the Capital Beltway (I -495). This interstate expressway provides connections from the north and south (I-95) and west (I-66, I-270). Major interchanges with 1495 in the vicinity of the WRAIR Main and the WRAIR Forest Glen include Georgia Avenue (State Route 97) and 16th Street (U.S. Route 29, State Route 29). These routes provide access to both the WRAIR Main and the WRAIR Forest Glen. The average daily traffic volume on 1495 is 144,000 vehicles per day.

The WRAIR Forest Glen is accessible from the southeast (East-West Highway to Grubb Road to Brookeville Road), northeast (Brookeville Road from Seminary Road and Georgia Avenue), north (Linden Lane from Seminary Road and Georgia Avenue), and west (linden Lane and Forest Glen Road). The four entrances to the WRAIR Forest Glen are located on the northern (Linden Lane at Woodstock Avenue), eastern (Linden Lane at Brookeville Road), and the southern (Stephen Sitter Avenue at Brookeville Road, Robert Grant Avenue at Brookeville Road) boundaries of the base. The internal road system of the base is in good condition. Major internal roads at the WRAIR Forest Glen include Linden Lane and Stephen Sitter Avenue. However, the road width at Linden Lane is considered substandard.

A study was completed in 1990 to characterize traffic patterns at seven major intersections providing access to the WRAIR Forest Glen. Under Montgomery County guidelines, a lane volume of up to 1,525 is considered acceptable. All of the intersections have acceptable traffic levels with the exception of Seminary Road and Georgia Avenue able Montgomery County hopes to improve conditions at 16th Street to reduce traffic on Georgia Avenue.

Table 4-2 Current and Predicted Critical Lane Volumes in the Vicinity of Forest Glen Section (Data taken from the New WRAIR EA)

	Critical Lane Volume (number of vehicles daily)			
Intersection	Current		1996	
	a.m.	p.m.	a.m.	p.m.
Steven Sitter Avenue and Brookeville Avenue	350	446	339	370
Steven Sitter Avenue and Linden Lane	265	388	265	388
Linden Lane and Woodstock Avenue	192	392	192	392
East-West Highway and Grubb Road	1337	1073	1506	1209
Linden Lane and Brookeville Avenue	852	722	1065	810
Seminary Road and Georgia Avenue	1671	1786	1881	2011
Linden Lane and Second Avenue	1059	1309	1192	1473

4.2.15.2 Public Transit

Commuter rail and bus service connecting Washington, DC, with the suburbs is available to the WRAIR Main and the WRAIR Forest Glen from the Washington Metropolitan Area Transit Authority. The Red Line of the Washington Metrorail System connects to Silver Spring. Service to the WRAIR Forest Glen from Silver Spring is available from the Montgomery County Transit System to Linden Lane. The metrorail is available at the WRAIR Forest Glen station approximately one mile from the installation. The station provides approximately 600 parking spaces for automobiles. A shuttle bus service between the WRAIR Main and the WRAIR Forest Glen carries approximately 600 people per day (Monday through Friday) during duty hours.

4.2.15.3 Air

Commercial airline service is available to the Washington metropolitan area through the airports located in the Washington and Baltimore. Air service is available at the Baltimore -Washington International Airport (BWI), Dulles International Airport (LAD), and Washington National Airport (DCA). A helicopter pad is located on the west-central portion of the Forest Glen installation but is used infrequently.

5.0 ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

5.1 Introduction

Section 5.2 assesses the potential adverse impacts to the environment associated with the continuance of WRAIR operations in their present locations and at its present scope and size until the New WRAIR is operational. Particular attention is given to the potential impacts to the health and safety of the WRAIR workforce from: (1) the limited activities to be conducted in the BSL-3 facilities (WRAIR Forest Glen), and (2) structural deficiencies of Building 40 (WRAIR Main). As detailed in Section 5.2.14 and Section 5.2.16, it is unlikely that significant impacts to the health and safety of the WRAIR workforce will result from the planned activities in the BSL-3 facilities at the WRAIR Forest Glen. Similarly, the ongoing, coordinated mitigation of the structural deficiencies of the WRAIR Main reduces the risk to the WRAIR workforce to an acceptable level (see Section 2.85.1).

5.2 Environmental Consequences of Routine Operations

Research methods, hazardous materials, and safety/containment practices used in those portions of the IDRP and HIVP conducted at the WRAIR parallel those used in the BDRP. Thus, the standards established in the BDRP FPEIS for weighing the potential impacts associated with BDRP research efforts are applicable, and have been utilized, for the examination of the potential adverse environmental consequences associated with WRAIR's conduct of IDRP, HIVP, and BDRP work.

An evaluation of the current and potential environmental consequences of the operations at the WRAIR is presented in this section and summarized in Table 5 -1. The proposed action and alternatives considered are analyzed relative to the conduct of present and currently planned routine activities. As detailed below, this analysis concludes that no significant adverse environmental effects are associated with continuation of present activities of the WRAIR. Moreover, positive benefits to the economy of the District of Columbia and Montgomery County and to the health of civilians and military personnel of the U.S. were identified.

The conclusions of this EA are based upon an evaluation of current activities at the WRAIR and any associated environmental impacts, potential adverse impacts resulting from cumulative effects, and an analysis of the potential for release of high-hazard microorganisms to the surrounding environment. The proposed action was evaluated after comparisons with the suggested alternatives. It was concluded that continuation of research activities by the WRAIR presents minor adverse impacts upon the environment and has more positive attributes than the proposed alternatives.

Table 5-1 WRAIR Routine Operations Impact Summary

POTENTIAL AREAS IMPACTED	ROU	TINE OPER	ATTON IMPAC	TS	
	POSIT	POSITIVE		NEGATIVE	
	Significant	Minor	Significant	Minor	
1. Land Use					
Agricultural					
Industrial					
Commercial			1		
Residential					
Recreation					
Wetlands				-	
Picodpinina					
Unique Geographical Area					
Policies					
2. Plant and suimai ecolo	57				
Population					
Terrestrial Habitats					
Aquatic Habitata					
Endangered Species					
3. Geology					
Soils					
Topography					
Erosios				1	
4. Water					
Surface	T		I	1	
Ground	1		 		
5. Air Quality	1		1		
Ambient Standards	T				
	 		 		
Biological	1		<u> </u>		
6. Agriculture	 		 		
Crops	+		 		
Livestock	1		1		
7. Cultural Resources	,				
Historicai	 		ļl		
Archaeological	1				

POTENTIAL AREAS IMPACTED	ROU	ROUTINE OPERATION IMPACTS				
	POSIT	POSITIVE		NEGATIVE		
	Significant	Minor	Significant	Minor		
S. Energy Resources						
Depletable				1		
Nondepletable						
9. Socioeconomic						
Demographics						
Aesthetics						
Noise				1		
Odor				1		
19. Economic Environmen	t					
Labor Force		1		· · · · · · · · · · · · · · · · · · ·		
Economic Activity		1				
Property Values	-	· · · · · · · · · · · · · · · · · · ·				
11. Public Opinion						
Controversial Issues	T			1		
Social Concerns						
12. Program Benefits						
Scientific Benefits			T			
Public Benefits						
13. Transportation	11		1			
Road	T		I I	1		
Red						
Air	1					
14. Human Health						
Workforce				1		
General Population	1	· · · · · · · · · · · · · · · · · · ·				
15. Safety	11		<u> </u>			
Construction	T		Γ			
Occupational						
Accidents	 		 	-		

Each major component of WRAIR's routine operations is discussed here regardless of the presence or absence *of* actual impacts. These analyses were made in the context of the baseline environment of the WRAIR, described ID Section 4.0 of this EA. Each identified area is ebonized in further detail to determine the magnitude and significance of actual impacts (see Section 4.2.1).

5.2.1 Land Use

The routine activities of the WRAIR Forest Glen do not have any significant impacts on land use. The activities of the WRAIR do not significantly alter existing environments. The land use patterns at the WRAIR Main and the WRAIR Forest Glen are consistent with zoning restrictions and conform to the current and planned development within the District of Columbia and Montgomery County.

Protected habitats such as wetlands near the WRAIR and Rock Creek are unaffected by routine operations of the WRAIR (see Section 4.2.4.1). During the course of routine operations, no contact is made between the WRAIR personnel and waste materials and the wetlands. The WRAIR facilities do not lie within the 100 year floodplain *of* any water body (see Section 4.2.4.1). More extreme flood events would rapidly dilute concentrations of chemicals and toxins below levels which would be deleterious to aquatic and terrestrial life.

The WRAIR does not discharge any waste materials directly to streams or rivers. Floodway Boundary and Floodway Maps for the District of Columbia and Montgomery County indicate that only a small portion of the Forest Glen Section is situated within the 100 year floodplain of any tributaries including Rock Creek (see Section 4.2.4). Significant environmental impacts to Rock Creek or other aquatic habitat from the WRAIR are not be anticipated under most flood conditions.

The ash from the incinerator which had been identified as containing chromium was disposed of as hazardous waste, and therefore did not impact soils in the Central Sanitary Landfill in Montgomery County (see Section 2.733 and Section 5 2.3).

5.2.2 Plant and Animal Ecology

The routine operations of the WRAIR have minimal potential for adverse impacts to either critical habitats or species of special concern. Federal or state endangered/threatened species or species of special concern are not present on the grounds of the WRAIR Main or the WRAIR Forest Glen. No state or federally endangered/threatened species are known to inhabit or frequent the District of Columbia or this area of Montgomery County. Moreover, the general alteration of the natural habitat within the Washington metropolitan region (urbanization) suggests this area is poorly suited for special concern species (see Section 4.2.2). Routine operations at the WRAIR do not have a significant impact on wildlife and vegetation. Consequently, the WRAIR does not exert a negative impact on special status plants and/or animals.

5-4

Routine operations do not have a significant impact on the soils and ecological habitat of the area (see Sections 4.2.1, 4.2.2, 4.23, and 4.2.4). Discharges of gaseous and liquid wastes and disposal of solid wastes originating from the WRAIR comply with state and Federal regulations and are unlikely to adversely affect native plants and animals (see Sections 2.73.1, 2.73.2, 2.733, 2.73.4, 2.735, and 2.73.6).

It is unlikely that releases of infectious biological materials from the WRAIR would negatively affect native plant or wildlife species. The organisms used at the WRAIR are not infectious to plants. Survivability agents or infected laboratory animals would be small if they escaped from the WRAIR (see Section 5.2.16.1). Moreover, there is no evidence that the WRAIR has ever released infectious etiologic agents to the environment during routine operations.

5.2.3 Geology

Routine operations of the WRAIR do not have a significant impact on the topography and soils of the Washington metropolitan region. During the conduct of normal activities, no disturbance is made to either the topography or soils at the sites of the WRAIR Main or the WRAIR Forest Glen.

A small negative impact to soil erosion may be expected from the contribution of the WRAIR to the Central Sanitary L landfill in Montgomery County. The landfill capacity of Montgomery County has recently been increased to more than 20 years. Because the volume of the waste contributed by the WRAIR is minute in comparison to the overall contribution, adverse environmental effects are negligible. The elevated concentrations of chromium in the incinerator ash did not adversely impact the local geology or soils because they were not disposed of in the landfill (see Section 2.733).

5.2.4 Water

5.2.4.1 Surface Water

Routine operations of the WRAIR have no significant environmental effects on surface water. It is highly unlikely that toxins and ecologic agents would be released in the effluent of the Blue Plains wastewater treatment plant because etiologic and toxic liquid wastes are discharged from the WRAIR only after being decontaminated (see Section 2.73.1). The Blue Plains treatment plant provides primary, secondary, and tertiary treatment to the effluent which further reduces any harmful concentrations of toxins and chemicals (Gaudy and Gaudy, 1980).

The buildings occupied by the WRAIR are not situated within the 100 year floodplain of any water body. No significant environmental impacts to Rock Creek or any other water body from the WRAIR would be anticipated under most flood conditions since potential floodwaters would not come in contact with the WRAIR facilities (see Section 4.2.4.1).

There are no significant adverse environmental effects to surface water or groundwater related to routine operations of the WRAIR. The peak consumption of water by the WRAIR is between 500 and 600 gallons per minute. Assuming the WRAIR consumes 600 gallons per minute for a 10 hour work day, the daily consumption would be 360,000 gallons. The Blue Plains wastewater treatment plant handles an average of approximately 300,000,000 gallons of wastewater per day (Dawnes, 1992a). The contribution of the wastewater generated by the WRAIR to the total volume of wastewater processed through the Blue Plains wastewater treatment plant is: (360,000/300,000,000) x 100 = 1.2 percent. The actual convolution of the WRAIR is much lower since this scenario assumes peak consumption for a 10 hour work day (Dawnes, 1992b). Thus, the wastewater generated by WRAIR operations produces a minor adverse impact.

5.2.4.2 Groundwater

The WRAIR does not use groundwater for routine operations, and wastewater is disposed through the Blue Plains wastewater treatment plant (see Section 5.2.4.1). Consequently, no negative impacts to groundwater result from WRAIR operations.

5.2.5 Air Quality

Ambient Air Quality

The WRAIR does not have any significant adverse impact on air quality because the WRAIR emissions are relatively small, well within permitted levels, and appropriate safeguards are in place to prevent significant adverse impacts (see Sections 2.7.2 and 2 73). Minor impacts on the ambient air quality arise from the electrical energy required for the operation/maintenance of the WRAIR, vehicular emissions from the automobiles of the commuting workforce, and the incinerator.

Consumption of electrical energy by the WRAIR indirectly contributes to adverse air quality because fossil fuels are used to generate electricity. Because the consumption of electricity by the WRAIR is a negligible component of the total electrical consumption of the Washington metropolitan region, this impact is minor.

Vehicular emissions from the motorized traffic associated with the WRAIR do not contribute significant quantities of pollutants to the atmosphere. These vehicles are a minor component of the current and projected daily traffic peaks in the vicinity (see Section 4.2.15.1). The only air quality problem in the Washington metropolitan region is elevated concentrations of ozone (see Section 4.2.5). The major source of triatomic oxygen in urban environments is vehicular traffic High concentrations of hydrocarbons and nitrogen oxides participate in photochemical reactions to produce ozone (Perkins, 1974). The traffic associated with the WRAIR workforce is a negligible component of the total traffic of the Washington metropolitan region. Consequently, the effect of the commuting activities of the workforce of the WRAIR on air quality of the region are minor.

The incinerator at WRAIR Forest Glen contributes to air emissions through waste stream management activities. The incinerator is rated to handle 350 pounds of waste per hour. On average, the incinerator is operated two times per week. Approximately 2,550 pounds of waste material consisting of used animal bedding, animal carcasses, and any solid waste containing potentially infectious or tome material are burned each day of operation (6,000 pounds per month) (see Appendix D). Air emissions from the medical waste incinerator are not an area of significant concern. The operating temperature and the types of materials burned in the incinerator result in small amounts of emissions to the atmosphere. The quality and quantity of emissions from the incinerator do not contribute significantly to ozone production (Perkins, 1974). Incineration activities are in compliance with regulations of the State of Maryland (see Section 2.733).

The MDE requires that ash from medical waste incinerators receive an annual chemical analysis because of its designation as a special handling waste. This testing is required prior to initial acceptance into the landfill and annually thereafter. TCLP analysis of the waste (RCRA classified waste) is required on an annual basis. The WRAIR is in compliance with these requirements (see Section 2.733).

Biological Air Quality

Environmental control of biological air quality by HEPA filtration during routine operations is described in the CDC/NIH Guidelines, in the BDRP FPEIS, Appendix 12. There is no evidence that infectious biological material has been ventilated by the WRAIR to the outside environment. The vast majority of the work performed by the WRAIR requires only BSL-1 and BSL-2 safety/containment practices (see Section 25). These activities are being conducted in accordance with the CDC/NIH Guidelines (CDC/NIH, 1988) and therefore pose no realistic threat to biological air quality. The limited amount of activities to be conducted by the WRAIR involving BSL -3 safety/containment procedures will also be performed in accordance with the CDC/NIH Guidelines (CDC/NIH, 1988). Adherence to the CDC/NIH Guidelines for activities involving the use of BSL -3 agents will likewise ensure that biological air quality will not create a significant adverse impact (CDC/NIH, 1988).

5.2.6 Agricultural Resources

The WRAIR does not come into contact with any agricultural resource during routine operations. Therefore, no negative impacts to agricultural resources result from WRAIR operations.

5.2.7 Cultural Resources

Routine operations of the WRAIR have minimal impact, if any, on cultural resources in the area The WRAIR Forest Glen is located approximately 1,200 feet from the Historic District Similarly, the WRAIR Main is located more than 1,000 feet from any potential

historic resource (see Section 4.2.7). Routine activities do not require contact with potential historic resource areas. Consequently, WRAIR routine operations do not adversely impact any cultural resource.

5.2.8 Energy

Depletable energy resources consumed by WRAIR operations are an extremely small portion of the total energy consumption of the Washington metropolitan region. Consequently, adverse impacts on depletable energy resources are minor.

5.2.9 Socioeconomic

Noise

Routine operations of the WRAIR do not have a significant impact on noise levels in the vicinity of the WRAIR Main or the WRAIR Forest Glen. Vehicular traffic, predominantly passenger vehicles, generates a small amount of noise at the WRAIR and off- Maintenance activities (e.g. transportation of supplies, disposal of wastes) do not significantly increase the noise level surrounding the WRAIR Main or the WRAIR Forest Glen. In general, the areas around the WRAIR facilities are quiet. There are no records of citizen complaints of excessive or objectional noise from any of the WRAIR operations. Routine operations of the WRAIR generate a negligible adverse noise impact.

Odors

Transiently offensive odors may originate from sterilization practices at the WRAIR and the incinerator at Forest Glen. Prudent safety practices in place for the biomedical activities at the WRAIR require that some material, including contaminated laboratory materials, animal remains, and wastewater, be rendered sterile through the use of beat treatment and incineration. These odors are minor and localized and are rapidly dispersed in the ambient atmosphere. Moreover, these odors are a necessary result of procedures used to control and contain infectious material. The MDE requires that incinerators with odor problems raise temperatures above 1200 degrees Fahrenheit. The infectious waste incinerator at Forest Glen burns at a temperature (1500 degrees Fahrenheit) which efficiently destroys most odors. Since there are no records of citizen complaints describing excessive odors originating from the WRAIR Main or the incinerator at Forest Glen, it is apparent that the odors emitted from the operation of the two facilities generate a negligible adverse odor impact (see Section 2.733).

5.2.10 Economic

The WRAIR employs approximately 690 people (military and civilian), most of whom reside in Montgomery County. These employees represent approximately 0.07 percent of the population of Montgomery County The current monthly payroll represents

approximately 0.0008 percent of the total county payroll. Although most of the WRAIR workforce resides in Montgomery County, this labor force does not have a significant economic impact on the local community. Nevertheless, the employment of 690 people and the economic activity generated by the WRAIR's procurement of supplies, services, and research efforts, results in minor positive economic impacts.

5.2.11 Public Opinion

Some individuals and special interest groups view development and production activities involving GEMs, high-hazard microorganisms, and toxins negatively. These activities remain controversial (see Appendices 6 and 10, BDRP FPEIS). Controversial aspects of these activities are unrelated specifically to the operations of the WRAIR but are better described as programmatic issues. Section 5.2 of the BDRP FPEIS addresses and details these concerns. Government facilities, including those supported by the BDRP, do not engage in work related to the production or use of offensive biological agents or toxins as defined by the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (Biological Weapons Convention of 1972). The U.S. is a signatory to the Biological Weapons Convention of 1972.

Representatives from the neighborhoods near the Forest Glen Section participated in the modifications to the-Revised Master Plan and endorsed both the proposed New WRAIR construction action and the conduct of routine operations of the WRAIR at the Forest Glen Section (The New WRAIR EA). The local community did not express concerns regarding the type of activities conducted by the WRAIR (see Section 4.2.14; Appendix G).

5.2.12 Program Benefits

Several benefits will be realized from the continuance of operations at the WRAIR. The primary benefit to public health is the contribution of research and diagnostic efforts to U.S. national defense. Furthermore, the disease agents under study at the WRAIR are naturally present in the environment including portions of the U.S. Therefore, the diseases caused by these agents remain a concern for both exposed civilians or military personnel who may be called to serve in various parts of the world. In addition, research and diagnostic activities at the WRAIR contribute to a greater understanding of disease prevention and treatment.

The activities of the WRAIR have numerous positive impacts in the fields of human health and protection of military personnel deployed overseas. A number of infectious agents of concern to the DA, including those researched at the WRAIR, cannot currently be controlled by vaccination or by available chemotherapeutic drugs. The benefit to the DA of this research is that, by determining the effective immune factors that prevent establishment of infectious agents in tissue, DA can design prophylactic or therapeutic regimens for protection of soldiers at risk.

The activities of the WRAIR also contribute to the scientific community at large. Through their activities as consultants and their participation in the greater scientific community, the WRAIR scientists share their experiences and expertise with industrial and pharmaceutical as well as with other U.S. and foreign agencies. The staff of the WRAIR are considered experts in infectious diseases. They have contributed a significant number of papers to the scientific literature (WRAIR, 1990a; WRAIR, 1992).

5.2.13 Transportation

The continuance of WRAIR activities has a minor negative impact on the traffic load of the area Traffic at the intersection of Seminary Road and Georgia Avenue is currently the worst in the immediate vicinity of the WRAIR Main and the WRAIR Forest Glen, and is projected to be even more congested by 1996 Table However, the vast majority of workers at the WRAIR Main and the WRAIR Forest Glen arrive and depart from their work locations prior to the morning and afternoon peak rush hours. Therefore, the contribution of the WRAIR workers' commuting activities to the peak traffic congestion periods is minor (see Section 4.2.15.1).

5.2.14 Human Health and Safety

Section 5 2.14.1 and Section 5.2.14.2 examine potential threats to the health and safety of the general public and the workforce associated with routine operations at WRAIR Potential threats to the health and safety of the public and personnel of the WRAIR in the event of a catastrophic occurrence are detailed in Section 5.2.16.1 and Section 5.2.16.2

5.2.14.1 Public Health and Safety

Risk to the health of people outside the WRAIR is extremely small. The majority of WRAIR activities require BSL-1 and BSL-2 safety/containment practices (see Section 2.5), and consequently do not pose a significant threat to public health and safety (CDC/NIH, 1988). The small amount of BSL-3 work which will be performed at the WRAIR will not pose a significant risk to public health and safety because all appropriate safety/containment procedures will be followed (CDC/NIH, 1988). The potential for release of etiologic agents from the WRAIR is extremely low. Release of infectious Biologic agents from the WRAIR is prevented by sterilization of all liquid, air, and solid wastes prior to discharge to the environment (see Section 2.7.2 and Section 2.73). Although certain citizens feel a degree of risk is associated with waste stream management, releases of infectious materials or chemicals to the outside environment have not occurred. SOPs are in place in the event of worker exposure to curtail release of etiologic agents to the outside environment.

Insecticides are applied to the facility monthly by a commercial pest exterminator. Building design features for the BSL-3 facilities will be consistent with CDC/NIH Guidelines

to prevent escape from or entry to the facility by insects and rodents (see Section 2.7.2; Appendix C; CDC/NIH 1988). There have been no instances of infection in the surrounding on or off campus community caused by organisms originating from any Army medical biological production or research laboratory, including the WRAIR, in over 40 years of operation (see Appendix 8, BDRP FPEIS). This information is consistent with the experience associated with similar laboratories throughout the U.S. (CDC/NIH, 1988).

The nature of the agents used at the WRAIR does not pose a significant threat to public health and safety in the unlikely event of a release. An analysis of the history of laboratories working with infectious etiologic agents concluded that there was minimal likelihood of disease occurring in the general populace as the result of laboratory activities (see Appendix 8, BDRP FPEIS; CDC/NIH, 1988). The potential for disease originating from laboratory quantities of BSL-3 agents in populations outside facilities such as the WRAIR is small (see Appendices 8 and 9, BDRP FPEIS). This analysis indicated very little possibility for either an individual outside the facility to acquire disease or for human-to-human transmission of diseases caused by BSL-3 agents such as those which will be employed in the activities of the WRAIR (see Appendices 7 and 8, BDRP FPEIS). It is unlikely that a person outside the WRAIR could contract a disease from an infected worker because human-to-human transmissibility is low for the particular BSL-3 agents which will be used at the WRAIR (see Appendix 7, BDRP FPEIS). The normal epidemiological pathways for the BSL-3 agents used in the IDRP and the BDRP, including those which will be used at the WRAIR, require insect vectors or are transmitted from non - animals to man. Thus, the natural mode of transmission for these agents is not human -to-human (see Appendices 7 and 9, BDRP FPEIS). There is very little possibility for an individual outside the facility to acquire disease.

Should material contaminated with HIV be released from either site, environmental conditions would rapidly inactivate the virus. HIV is a relatively fragile virus. Exposure to drying conditions, as would be expected if any HIV material escaped to the outside environment, results in a more than 90 percent inactivation of the virus within several hours (CDC, 1987). Moreover, HIV is usually transmitted though sexual contact, exposure to infected blood or blood components, and perinatally from mother to fetus (CDC, 1987). In the improbable event that a worker became infected by HIV through workplace exposure, it would not be spread among the general population through casual contact (CDC/NIH, 1987). Furthermore, no HIV-contaminated material is known to have been released from the WRAIR.

5.2.14.2 WRAIR Worker Health and Safety

The analysis of the health and safety of the WRAIR workforce required an evaluation of the potential impacts associated with both the use of certain research substances and the physical environment within which the WRAIR mission is performed. Two conclusions were drawn from this analysis. First, the real and potential impacts associated with the utilization of hazardous substances was negligible. Second, real and

potential adverse impacts existed, albeit minor, as a result of the condition of the facilities within which worn is conducted.

Hazardous Substances Utilization

As identified in Section 2.7.2, WRAIR research operations involve the use of certain hazardous substances. They include etiologic agents, chemical agents, radioisotopes, and non -ionizing radiation. They also includ e GEMs, which present no real hazard (BDRP FPEIS, 1989), but which are included for purposes of analysis due to concerns of some members of the public with their use.

WRAIR employs a calculated assortment of safety, accountability, operational, and regulatory controls whenever utilizing the identified hazardous substances. These controls are mandated by WRAIR Regulation 385 -10 (implements and supplements Federal, state, and Army statutory, regulatory, and directive requirements), and other internal and external regulations governing the use of the specific substances at issue, which provide an extensive program for ensuring worker health and safety during the course of WRAIR operations. An examination concerning the effect that these controls have upon WRAIR operations was conducted. It was concluded from this examination that WRAIR's implementation of these controls mitigated and contained the workforce hazards associated with the use of the identified substances (see Section 2.73). This determination is consistent with conclusions regarding workforce health and safety identified in previous USAMRDC NEPA documents (BDRP FPEIS, 1989; USAMMDA, 1992, USAMRICD, 1992).

The majority of WRAIR's operations concern research devoted to the development of medical measures for the prevention and treatment of human disease and illness. Consequently, etiologic agent use is an appropriate example to rely on in identifying the extent of the real and potential worker health and safety impacts associated with WRAIR's use of the identified hazardous substances. Building 508, WRAIR Forest Glen, is an operational BSL-3 laboratory (although no BSL-3 work is presently being conducted). Building 501, WRAIR Forest Glen, is in the process of being renovated to house BSL-3 operations. Consequently, the most hazardous working conditions present at WRAIR will result from the [united amount of work which will be performed with BSL -3 agents. BSL-3 is required when working with indigenous or exotic agents where the potential for infections by aerosols (or by autoinjection or ingestion) is real and the disease may have serious or lethal consequences (CDC/NIH, 1988).

WRAIR's BSL-3 operations. will be performed in compliance with WRAIR Regulation 385 -10 and the CDC/NIH Guidelines (CDC/NIH, 1988). Redundant facility, equipment, practice, and training features are utilized to create a barrier between the hazard and the worker.

Engineering Controls

Engineering controls will serve as the primary barrier between the etiologic agent and the worker during activities involving BSL-3 materials. Safety equipment includes biological safety cabinets, HEPA -filtered ventilation systems, and a variety of enclosed containers. Biological safety cabinets are box -shaped devices of various sizes which limit the worker's exposure to the hazardous agent in use. With a glass plate through which the worker can see to perform the research, the sole portion of the worker in contact with the agent is the worker's hands and lower arms. Negative airflow (ventilation drawing towards the cabinet, and up and away from the worker within the cabinet) effectively draws aerosolized particles of hazardous agent away from the worker and towards a HEPA filter (see Section 5.25 for the impacts associated with HEPA filtration; CDC/NIH, 1988).

Enclosed containers are another form of safety equipment which will be utilized in WRAIR BSL -3 operations. These containers will prevent aerosols from being released, especially during those operations performed (within the BSL-3 facility) outside of a biological safety cabinet. An example is a safety centrifuge cup.

Personal protective equipment include items such as gloves, coats, gowns, shoe covers, boots, and safety glasses. For example, surgical gloves and medical gowns will be utilized when working in a biological safety cabinet and effectively protect those portions of the worker (hands and lower arms) that are exposed within the cabinet.

Containment Facilities

Containment facilities will serve as secondary barriers between the hazardous agent and the worker. The WRAIR BSL-3 facilities, in conformance with regulatory requirements, will possess access control and specialized (negative air flow and HEPA filtration) ventilation systems. These physical features will adequately limit the potential for exposure to an agent to those workers within the BSL-3 containment suite. The general population, WRAIR non-personnel, and laboratory personnel at Building 508 and Building 501, WRAIR Forest Glen, but outside the containment suite, will avoid etiologic agent exposure.

<u>Laboratory Practices and Periodic Training</u>

Laboratory practices and periodic worker training will serve as the final, and in many ways, the most important barrier to etiologic agent exposure. Personnel working within the BSL -3 laboratory will be made aware of the potential hazards associated with the utilized agent and will be trained and made proficient in the practices and techniques required for safely handling the agent. Consistent with the CDC/NIH Guidelines (CDC/NIH, 1988), WRAIR Regulation 385-10 mandates practices and procedures designed to minimize and eliminate risks. For example, workers will apply a chemical shower, designed to destroy any agent with which the worker may have become exposed, upon exiting the BSL-3 facility. Additionally, because no system is totally effective if used improperly, periodic training will

be conducted to ensure that workers correctly utilize the biological safety cabinet other laboratory equipment.

The use of BSL-3 facilities, equi pment, practices, and training, together with remaining safety, security, operational and regulatory controls governing the cradle -to-grave (transportation, receipt, handling storage, and disposal) use of etiologic agents (as well as the use of the other identified hazardous substances) will reduce to negligible the risk to health and safety faced during routine operations by WRAIR personnel.

The historical safety record of the WRAIR supports the conclusion that routine operations involving hazardous substances result in a negligible impact to the health and safety of the workforce. The incidence of laboratory-acquired illness at the WRAIR is extremely low. Moreover, in the last five years and since the implementation of mitigation measures, no serious accident involving any WRAIR personnel has occurred (see Section 2.8.4).

Physical Environment

As identified in Section 2.8.5.1, WRAIR Main (Building 40) has several structural deficiencies that create an unreasonable health and safety (fire) risk to the WRAIR workforce taken over the useful life of the building The WRAIR Main structural deficiencies which have been subjected to coordinated mitigation since 1990, and which is fully mitigatable in approximately four years when the New WRAIR becomes operational, underwent intense analysis during preparation of this EA The following discussion documents the conclusion of USAMRDC that the WRAIR Main structural deficiencies culminate in a minor adverse impact upon the health and safety of the workforce.

Significance Test

In determining whether a major Federal action will significantly affect the quality of the human environment, NEPA normally requires that the action agency (USAMRDC) review the proposed action in light of two relevant factors: (1) the extent to which the action will cause adverse environmental affects in excess of those created by existing uses in the affected area, and (2) the absolute quantitative adverse environmental effects of the action itself, including the cumulative harm that results from its contribution to existing adverse conditions or uses in the affected area

The first factor permits consideration of the existing environment, and, therefore, grants an agency greater latitude to identify an impact as minor. The second factor is a check and balance on the first, under those circumstances where the proposed use may be said to be the final straw that breaks the back of the environmental camel. For example, a factory that pollutes the air would probably result in a significant adverse impact if constructed in a national park, in a farm community, or in a suburban housing development, but might very well, applying the first factor, generate a minor impact in an urban area

zoned for industrial use. Nevertheless, should the pollution from the factory be the final source propelling the area's air quality beyond acceptable levels, then its impact is significant regardless of existing uses.

Two factors, unique to NEPA analysis and not part of the fact pattern when the Significance Test was established, are present in the environmental assessment of the WRAIR. First, this EA examines the real and potential environmental impacts associated with an ongoing activity (the continuance of WRAIR operations in their present scope and size), as opposed to the examination of a non-existent proposed action. Second, the subject of issue (Building 40) was constructed nearly 80 years ago and prior to the enactment of NEPA. While neither of these factors are totally controlling in the identification of the extent of the impact, USAMRDC has concluded that they are relevant. Consequently, where the Significance Test contemplates consideration of the location where a proposed action will take place (i.e., Existing uses in the affected area" and "existing adverse conditions or uses in the affected area"), USAMRDC, applying agency discretion, has considered the location where the action presently occurs - Building 40, WRAIR Main.

Analysis of Structural Deficiencies

The first tier of the Significance Test requires an examination of the extent to which the action will cause adverse environmental affects in excess of those created by existing uses in the affected area - the action being the operation of the WRAIR and the existing uses in the affected area being Building 40. Building 40 suffers from physical deficiencies which create some risk of fire. The primary deficiencies causing the hazard are the lack of a sprinkler system, the absence of fire-protective stairwells, the lack of fire rated doors in building corri dors, and an inadequate and overtaxed wiring and electrical system. However, as demonstrated in Section 2.85.1, the application of mitigation measures has resulted in a significantly reduced fire hazard (Wall, 1992). For example, equipment utilizing large amounts of electricity has been relocated outside the building, flammable -chemical storage cabinets have been procured, the use of temporary wiring has been minimized, and deficient electrical outlets have been, or are in the process of being, repaired, all in order to reduce the risk of fire. Additionally, equipment has been removed from crowded halls, emergency lighting has been installed in the stairwells, and flammable chemical storage cabinets have been moved from stairwells, to provide safer and faster egress in the event of fire (see Section 2.85.1).

With implementation of this mitigation, structural hazards alone remain. That is, the hazards result from the structural characteristics of Building 40, and not from the operations performed, or equipment contained, within it. Sprinkler systems, fire -protective stairwells, and fire rated doors are all fire code requirements established well after both the initial construction of Building 40, and its later renovation to research use. The wiring/electrical system likewise date to the initial use of Building 40, and met the requirements existing at that time.

The fire hazards unrelated to the character of Building 40 and the hazards associated with WRAIR operations are negligible (see discussion of Hazardous Substances Use, above). Because no significant adverse fire hazards exist in excess of those created by Building 40, and because the Building 40 hazards derived from an agency action (construction of Building 40) taken between 30 to 70 years ago and in compliance with then existing health and safety requirements, the adverse impacts resulting from the Building 40 structure are minor. Because the first factor of the Significance Test limits consideration to those impacts in excess of the existing affected environment of Building 40, and because the excess impacts are negligible, routine operations within Building 40 do not initially generate significant adverse environmental impacts.

The second tier of the Significance Test requires an examination of the absolute quantitative adverse environmental effects of the action itself, including the cumulative harm that results from the action's contribution to existing adverse conditions or uses at Building 40. It is here that it must be determined whether (regardless of the existing, pre-NEPA nature of Building 40) the structural deficiencies, quantitatively or cumulatively, result in a significant adverse impact.

Three mitigation measures have been, or will be, implemented, that adequately reduce the structural impacts to a minor level. First, the correction of the non-structural fire hazards identified above go far towards minimizing the probability of fire, and the risk of injury in the event of fire, at least in the near -term. Additional implemented measures, *such* as increases in laboratory safety training emergency evacuation training and safety and fire inspections, and establishment of a smoking ban, are expected to further mitigate the probability that a fire will occur within the next four years (see Section 2.8.5.1). Finally, these abatement actions need only address fires that may occur during the next four years (until transfer to the New WRAIR).

The full extent of the completed and continuing mitigation significantly reduces the probability and harm expected to result from a fire (Wall, 1992). In addition, these actions need minimize the risk for only four additional years (a portion *of* the life *of* an activity or facility). Consequently, the Building 40 structural deficiencies do not quantitatively or cumulatively result in a significant adverse impact on worker health and safety.

5.2.15 Areas of Minor Concern

Adverse impacts concerning animal care and use at the WRAIR are minor. The inadequate environmental control and sanitation systems at the WRAIR Forest Glen and the WRAIR Main animal facilities were all the result of deteriorating physical facilities. These deficiencies have been substantially mitigated by reductions in animal numbers. Renovations to Building 511 and Building 512 at WRAIR Forest Glen are scheduled to begin in November, 1992, and ongoing repairs to Building 40 at WRAIR Main will completely mitigate adverse impacts related to animal care and use (see Section 2.85.2).

5.2.16 Accident and Incidents

In certain cases, it is appropriate to examine the potential adverse consequences associated with realistic, potential, accidents or incidents. Analysis is proper when the activities evaluated in the EA are subject to stringent controls or are presently being mitigated, because an accident/incident may minimize the effect of the controls/mitigation. The examination must concentrate, first, on whether an accident or incident will negate the effect of the controls of mitigation and, second, in the event of such a breakdown, on the potential adverse impacts that may result. In the course of preparing this EA, two areas were identified that required accident/incident analysis - the controlled use of etiologic agents/toxins and the mitigated health and safety (fire) hazards generated by WRAIR Main, Building 40.

5.2.16.1 Etiologic Agents/Toxins

Hypothetical release of etiologic aerosols or infected rodents has been evaluated previously in the BDRP FPEIS which discussed the likelihood of escape and survival of infectious agents outside of a facility such as the WRAIR using Maximum Credible Events (MCE) methodologies (see Appendix 9, BDRP FPEIS). MCEs are considered worst case events which realistically might occur, although the probability of such events is very low. These hypothetical events represent the most severe circumstances. The activities, procedures, and operations used in handling BSL -1/BSL-2 and BSL-3 etiologic agents are consistent with those examined in the BDRP FPEIS (see Appendix 4 and Appendix 5, BDRP FPEIS). Given the similar research methods and environmental controls employed in the IDRP, HIVP, and BDRP, MCEs examined in the BDRP FPEIS apply equally to the BDRP and non-BDRP work conducted at the WRAIR. Consequently, the general conclusions of the MCE analysis in the BDRP FPEIS were applied in analyzing the potential harm to the environment resulting from hypothetical accidents and incidents at the WRAIR.

The multiple, redundant containment barriers, controls, and procedures which will be used during BSL -3 operations at the WRAIR will reduce the possibility of negative impacts of any potential accidents/incidents to members of the public, the workforce of the WRAIR, and the environment. The small quantities of high hazard organisms which will be used at the BSL -3 facilities of the WRAIR, and the current quantities of hazardous chemicals, and radioactive materials used at the WRAIR pose no potential for significant adverse impacts to the environment. Hypothetical release beyond all containment barriers would rapidly dilute the concentrations of these materials below thresholds necessary to produce significant adverse effects. The categories of accidents/incidents analyzed in the BDRP FPEIS included aerosol release from a facility, laboratory accidents, and unexpected external events. The BDRP analysis of various maximum credible accident and incident scenarios concluded that there was no risk to the public and the environment and only a negligible risk to an immunized workforce. Unreasonable MCEs were not analyzed in this EA because the probability of such events is very low (Appendix 9, BDRP FPEIS; 40 CFR 1502.22).

It must be noted at the outset that the vast majority of etiologic agent/toxin work performed at WRAIR is conducted in a BSL-1/BSL-2 environment (mow hazard" organisms). Low hazard organisms include a broad spectrum of indigenous microorganisms present in the community and associated with human disease of varying severity as well as organisms present in the environment and not known to cause disease in healthy adults humans (see Appendix 4, BDRP FPEIS). Because such agents are already present in the local environment, and because they are not known to cause human disease outside their normal mode of transmission, it has been determined that the accidental release of low hazard organisms will result in no more than a negligible adverse environmental impact (see Appendix 4 and Appendix 9, BDRP FPEIS). Consequently, the analysis of accidents and incidents was limited to the BSL-3 operations to take place at WRAIR Forest Glen.

The BDRP FPEIS described the physical dynamics and dispersion models for particles equivalent in size to agents used at the WRAIR. The maximum spread of airborne hazardous materials during an accident is calculated to remain within the walls of the WRAIR buildings because of the state -of-the-art containment systems, biological safety cabinets, HEPA filters, and the limited quantities of hazardous materials on site (see Sections 2.7.2 and 2.73). Infectious organisms must be handled at the levels of safety and containment that meet or exceed all Federal, state, and local regulations and guidelines (see Section 2.7.2 and Section 2.73; Appendix C).

Accidents within the WRAIR

The BDRP FPEIS (Appendix 9) provided an evaluation of the potential threat to the environment and the workforce associated with the hypothetical release of two representative BSL-3 organisms (Q fever and Rift Valley fever virus). Although infectious *High Hazard* agents other than Q fever and Rift Valley fever virus will be used at the WRAIR (see Section 2.4.1.1), an analysis limited to examining the potential impacts resulting from the accidental release of these two agents adequately addresses the risks associated with an accident or incident involving any etiologic agent requiring BSL -3 containment and practices. Q fever and Rift Valley fever viruses are representative of the high risk (BSL-3) agents to be used at the WRAIR and possess characteristics typical of all BDRP Risk/Issue Category I (High Hazard Organisms). Etiologic agents classified as requiring BSL -3 have similar virulence, pathogenicity and communicability and are most likely spread by the aerosol route (see Appendix 4, BDRP FPEIS; CDC/NIH 1988). Conditions at the new BSL-3 facilities of the WRAIR will be consistent with the safety procedures and engineering controls for BSL-3 activities (see Section 2.7.2 and Section 2.73; Append* C; CDC/NIH, 1988). Therefore, the BDRP FPEIS MCE scenarios for BSL-3 laboratories are directly applicable to the WRAIR

The scenarios analyzed in Appendix 9, BDRP FPEIS, indicated no credible evidence of risk associated with workplace exposure even in the event of a major laboratory accident. The group of individuals who were at the greatest risk were laboratory personnel in close

contact with high-hazard organisms. Non-laboratory workers were not demonstrated to be at any significant risk.

Aerosol Release from the WRAIR

Environmental control of biological air quality by HEPA filtration during routine operations is described in the CDC/NIH Guidelines (CDC/NIH, 1988), in the BDRP FPEIS, Appendix 12, and in Section 2.7.2 of this document. The BDRP FPEIS described the physical dynamics and dispersion models for biological agents used at BDRP facilities (see Appendix 9, BDRP FPEIS). The BDRP FPEIS evaluated MCEs for aerosol exposure to BSL-3 agents. The maximum spread of airborne hazardous materials during an accident is calculated to remain within the walls of the BSL-3 laboratories because of the state-of-the art containment systems, biological safety cabinets, HEPA filters, and the limited quantities of hazardous materials on site (see Appendix 9, BDRP FPEIS). Conditions at the WRAIR will meet or will be less extreme than these situations. Therefore, no new calculations are needed for the BSL-3 facilities of the WRAIR. Infectious organisms will be handled at the appropriate levels of safety and containment meeting or exceeding all Federal, state, and local regulations and guidelines (see Section 2.7.2 and Section 2.73; Appendix C; CDC/NIH, 1988).

It is unlikely that native plant or wildlife species would be negatively affected by releases of etiologic materials from the WRAIR. During routine operations, there will be no releases of etiologic waste. Survivability of infectious agents or infected laboratory animals would be small if they escaped from the facility. In addition, rapid changes in atmospheric humidity and the presence of ultraviolet radiation from the sun would further decrease survival of the organisms (see Section 5.2.14.1). The organisms used at the WRAIR are not infectious to plants. Moreover, there is no evidence that etiologic agents have been released by the WRAIR to the environment. Consequently, it is unlikely that routine operations of the WRAIR have deleteriously affected native plant and wildlife.

Non-Aerosol Release from the WRAIR

There is minimal possibility that etiologic agents could escape from the WRAIR through routes other than aerosol release. All potentially hazardous liquid wastes will be sterilized prior to discharge to the sanitary sewer system (see Section 2.73). Solid wastes which may be potentially infectious will be autoclaved and incinerated (see Section 2.73.2 and Section 2.733). The animal containment facilities at the WRAIR, including those used for biological vectors, will be designed to prevent the escape of potentially contaminated animals (see Section 2.7.2). If laboratory animals did surmount all levels of containment and escape outside the facility, their survivability would be small because of such factors as starvation and perdition. Moreover, some of the agents to be studied at the WRAIR are naturally present in the environment including portions of the United States (see Appendix 9, BDRP FPEIS). In the event that an infected animal did escape from the WRAIR or that

a large quantity of infectious material was emitted to the environment, very low rates of survivability the hosts and infectious organisms suggest limited environmental impacts.

Unexpected External Events

Additional scenarios in which infectious organisms would be released from the WRAIR include external events such as airplane crashes, bombs, tornadoes, and floods. For a large external release of an infectious agent to occur, a series of catastrophic failures must occur in multiple containment barriers. The total amount of etiologic material at the WRAIR is small in aggregate. Therefore, generation of an effective aerosol containing etiologic agents is an improbable threat since the majority of these particles originating from these hypothetical external events would be in the form of droplets and would quickly settle.

External events such as airplane crashes and tornadoes might allow all levels of containment to be breached; however, they would simultaneously create an inhospitable environment for the etiologic agent (see Section 5.14.1). Such events would rapidly kill organisms and/or dilute the concentrations of the agent below *those* considered necessary for infections (see Appendix 9, BDRP FPEIS).

5.2.16.2 Fire at Building 40

Operations within Building 40, WRAIR Main, are subject to comprehensive mitigation measures. This mitigation reduces, but does not eliminate, the risk of fire and the potential impacts that may result in the event of a fire. Catastrophic events, such as fire, have the potential to negate the effectiveness of mitigation. Consequently, it must be determined whether a fire at Building 40 will negate existing mitigation measures and cause significant adverse environmental or health and safety impacts.

Mitigation measures in place at Building 40, to include reductions in the use of temporary wiring and equipment utilizing high amounts of electricity, the repair of deficient electrical outlets, and the procurement of new chemical storage cabinets, have reduced the probability of fire. This means that a fire is expected to occur sometime in the life of the building The implementation of additional measures, such as prohibitions of the use of personal appliances and on smoking within Building 40, further reduce the outbreak of fire. With implementation of this coordinated mitigation, the probability of fire has been significantly reduced, and although expected during the useful life of Budding 40, it is not expected to occur prior to commencement of operations within the New WRAIR

In the event a fire does occur within the next four years, several implemented measures, to include the removal of equipment from crowded hallways, the addition of emergency lighting, and the establishment of emergency evacuation training, limit to a minor degree, the adverse impacts expected during emergency evacuation from the building This mitigation, and the other abatement measure implemented at Building 40, are, in their nature, designed to survive a fire, Consequently, in the event of a fire, the safety measures

in place are expected to allow egress from the building with only minor adverse impact to the exiting personnel.

5.2.17 Cumulative Impacts

The CEQ regulations implementing NEPA define cumulative impacts to the environment as those effects resulting from the impact of the proposed action when combined with past, present, and future actions (40 CFR 1508.7). Thus, cumulative impacts are the sum of all direct and indirect impacts, both adverse and positive, that occur above the environmental baseline. Cumulative impacts may be impacts accrued over time and/or impacts in conjunction with other pre-existing effects from other activities in the area (40 CFR 1508.25). This analysis concluded that there will be no significant negative cumulative impacts to the environment arising from the conduct of routine and currently planned activities at the WRAIR. Section 5.2.17.1 describes the cumulative impacts of the WRAIR over time. An analysis of the cumulative impacts of the WRAIR in conjunction with other activities in the geographical area are provided in Section 5.2.17.2

5.2.17.1 Impacts over Time

The WRAIR has performed biomedical activities at its current locations for more than 40 years with no appreciable negative impacts to either the workforce or the environment. The WRAIR must comply with all relevant state and Federal regulations governing air, water, and solid waste discharges. The quantities of materials emitted by the WRAIR to the environment are extremely small. Based on an analysis of the activities of the WRAIR in the context of the environmental setting, there is no reason to indicate that significant negative cumulative impacts occur because of the ongoing work at the WRAIR.

5.2.17.2 Impacts in Conjunction with Other Activities in the Area

The landfill activities of those entities utilizing the Central Sanitary Landfill do not result in negative impacts to soils or land use. Landfill capacity of Montgomery County is more than 20 years. Therefore, the WRAIR does not contribute to significant cumulative impact to the land quality of Montgomery County (see Section 5.2.1).

The Washington metropolitan region is heavily urbanized and thus poorly suited for wildlife in general and special concern species in particular (see Section 5.2.2). The operations of the WRAIR consequently do not contribute to adverse cumulative impacts to plants and animals of the area

The Potomac River is the repository for the discharge from the Blue Plains wastewater treatment plant and maintains Use I water standards (suitable for water contact recreation and protective of aquatic life) (COMAR 26.08.02). The wastewater from the Washington metropolitan region does not result in significant negative cumulative effects to

the Potomac River (see 5.2.4). There will thus be no significant cumulative impacts of the operations of the WRAIR to surface water.

The air quality of the Washington metropolitan region is good in general. Ozone concentrations exceed NAAQS standards, are considered serious (see Section 4.2.5), and are most likely the result of vehicular emissions (Perkins, 1974). The commuting activities of the WRAIR workforce and support activities such as deliveries contribute to ozone production through vehicular emissions. The quantity of these emissions indirectly and directly generated by WRAIR activities is negligible relative to the remainder of the Washington metropolitan area The qualitative characteristics of the WRAIR vehicular emissions are not different than other vehicles in the Washington metropolitan area Therefore, the contribution of the WRAIR to the regional ozone problem is a minor adverse cumulative impact

A minor adverse cumulative air quality impact exists. The District of Columbia metropolitan area has been identified as a serious ozone non-attainment area (see Section 4.2.5 The WRAIR's contribution is limited to vehicular emissions. As federal activities, the WRAIR will participate in meeting the requirements of the Clean Air Act Amendments of 1990. The WRAIR will take part in car pooling programs and a percentage of the government vehicles traveling to and from the WRAIR will be powered by alternative fuel sources. Consequently, actions at the WRAIR are expected to contribute to decreasing the minor adverse cumulative air impact.

Traffic congestion in the Washington metropolitan region, including the vicinity of the WRAIR Main and the WRAIR Forest Glen, is a problem (see Section 4.2.15.1). The WRAIR is not a significant component of this problem, however, because duty hours for most of the workforce begin and end prior to the morning and afternoon peak rush periods (see Section 5.2.13).

5.3 Comparison of the Proposed Action and the Alternatives

5.3.1 Alternative I Continuance of WRAIR Operations,, at the Existing Facilities, in their Present Scope and Size, Into the Distant Future

This alternative includes the continuance of activities at the WRAIR Main and the WRAIR Forest Glen. Appropriate controls are in place to minimize the impacts of WRAIR operations on the environmental quality of the area Implementation of this alternative entails completion of the remaining coordinated mitigation measures described in Section 2.8.5.1 and Section 2.85.2, and continuance of WRAIR operations at both sites into the distant future (i.e., after 1997). As described previously, the coordinated mitigation measures have significantly reduced current and near-term risks to WRAIR worker safety and health to an acceptable level (see Section 5.2.14.2). Continuing WRAIR operations at the existing facilities beyond 1997 is undesirable because this will represent an unreasonable risk to WRAIR worker safety and health.

More extensive renovations to Building 40 would be required to maintain worker safety and health at an acceptable level in the long-term (i.e., after 1997). The estimated costs of complete modernization of Building 40 are in excess of the cost to construct the New WRAIR (WRAIR, 1991). In addition, extensive renovations would be disruptive at all levels of WRAIR operations resulting in severely reduced operating efficiency. Given that the expense to renovate the WRAIR Main and the WRAIR Forest Glen is in excess of the costs of constructing the New WRAIR, and that the previous environmental evaluation of the construction resulted in a Finding of No Significant Impact, this alternative is not the preferred action (see Section 3.4.1).

5.3.2 Alternative II - Temporary Transfer of Operations to Another Location

This alternative entails the temporary transfer of WR AIR activities to a different location. For example, the work conducted at the WRAIR could be transferred to another property such as leased space. Similarly, the activities performed at the WRAIR could be contracted out to universities or private entities. Because performing the same work that the WRAIR is currently doing at another location would require the same controls and regulatory compliance, the net result is envisioned to be the same as the preferred alternative. That is, minor impacts attributable to Building 40 would be eliminated; no substantive change to the number and degree of minor adverse impacts on the environment generated by routine operations.

As detailed in Section 3.4.2, the temporary transfer option is not preferred because such an action is neither economical nor efficient given the commitment of funds to construct and operate the New WRAIR (see Section 3.4.2).

5.3.3 Alternative No Action (Cease Operations) Alternative

This alternative includes the discontinuance of present and currently planned activities of the medical IDRP, military HIVP, and medical BDRP missions at the WRAIR. The environmental consequences of activities conducted at the WRAIR have been considered in this EA and none were found to be significantly adverse. Termination of WRAIR operations will not result in a significant improvement to the environmental quality of the area because the impacts of WRAIR activities are extremely small. Appropriate controls are in place (e.g., operational, safety, environmental) to ensure that these activities are being conducted without significant adverse impact to the environment (see Sections 5.2.14, 5.2.15, and 5.2.16).

Terminating WRAIR activities would seriously impair the national defense posture with respect to infectious disease threats to U.S. military personnel. Because no significant adverse environmental effects have been identified with activities as they are or will be conducted at the WRAIR closure of the WRAIR would not significantly reduce adverse impacts nor produce beneficial environmental effects. Termination of the activities

conducted at the WRAIR would not eliminate concerns associated with this type since similar efforts are performed at various locations within the DA, the public sector, and the academic sector.

5.3.4 Alternative IV - Continuance of WRAIR Operations, at the Existing Facility Pending Move to the New WRAIR

This EA did not identify any significant environmental effects resulting from the current and planned activities by the WRAIR This alternative includes completing the currently planned mitigation measures to Building 40 (see Section 2.8.5.1). The completed and continuing coordinated mitigation measures to Building 40 (WRAIR Main) have reduced, and will continue to reduce, risks to the workforce to an acceptable level until the New WRAIR becomes operational (see Sections 5.2.14, 5.2.15, and 5.2.16). Implementation of this alternative involves the continuation of certain adverse impacts such as contributions to the waste stream and negligible risks to the health and safety of the workforce until the New WRAIR is operational. No adverse cumulative impacts to the environment are anticipated.

Construction of the New WRAIR is more cost-effective than either Alternative I or Alternative II (WRAIR, 1991). Implementation of this alternative also involves the efficient continuation of program benefits, e.g., contributions to the national defense, scientific community, and civilian health as discussed in Section 5.2.12 of this EA (see Section 3.4.4).

6.0 CONCLUSIONS

The proposed action of continuing operation of the WRAIR in its present scope and size until the New WRAIR becomes operational will have no significant adverse impact to the environment or worker health and safety. The activities conducted by the WRAIR support development and fielding of medical materiel used to protect at-risk individuals including deployed military personnel. Continuation of WRAIR operations will result in important benefits to the country and the world.

Alternatives to the proposed action evaluated in this EA included continuance of WRAIR Operations in Their Present Scope and Size Into the Distant Future (Alternative D, Temporary Transfer of Operations to Another Location (Alternative II), and No Action (Cease Operations) (Alternative III). None of the alternatives considered, including the preferred alternative, will result in significant adverse impacts to the environment or the health and safety of the workforce and public. Implementation of Alternative I, however, would require major renovations to Building 40 by approximately 1997 to ensure continued low risks to the workforce. Neither Alternative I nor Alternative II would alter the minor negative impacts associated with routine operations. Initiation of either of these two alternatives would, however, reduce the impacts generated by the features of Building 40. Alternative III would eliminate the minor adverse effects generated by both Building 40 and routine WRAIR operations.

Potential risks to the environment associated with accidental release of dangerous substances or hazardous organisms from the WRAIR during current and planned activities are extremely small. Coordinated mitigation measures implemented at WRAIR Main ensure risks to worker health and safety will remain at acceptable levels. No significant cumulative impacts to the environment were identified, and none are anticipated during continued operations of the WRAIR. Benefits of the continued operation of the WRAIR Main and the WRAIR Forest Glen far outweigh the risks.

The most severe potential effects associated with implementation of the preferred alternative will be minor, and all actually observed effects will be insignificant. WRAIR has conducted research activities for more than 40 years, and the environmental quality of the area remains good. Detailed environmental analyses of the operations of the WRAIR did not reveal any significant adverse environmental impacts associated with the proposed action.

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8.0 PERSONS AND AGENCIES CONSULTED

INDIVIDUAL	AFFILIATION	TELEPHONE
Henry Bernstein	Montgomery Co. Economic and Community Development	(301) 217-2345
Willie Boyd	WRAIR	(202)576-3607
Dennis Canavan	Maryland-National Capital Park and Planning Commission	(301)4954585
Laramie Daniel	Maryland Department of the Environment	(410)631-3220
Bruce Dawnes	Washington Suburban Sanitary Commission	(301)206-8828
Ron East	I-95 Landfill	(703)690-6694
Greg Golden	Maryland Department of Natural Resources	(301)974-3846
Mary Goodman	Montgomery Co. Parks and Planning	(301)4954700
Col. Hall	WRAIR	(301)427-5193
Harry Hansen	Maryland Geological Survey	(410) 554-5500
Donald Henne	U.S. Fish and Wildlife Service	(215)597-5378
James Hill	Maryland - National Capital Park and Planning Commission	(301)650-2600
Robert James	U.S. Geological Survey	(410) 828-1535
Nat Levy	Washington, DC, Office of Planning	(202) 727-6492
Donald MacLaughlin	Maryland Forest, Park and Wildlife Service	(410)974-3776
Gregory McClaine	Montgomery Co. Zoning and Planning	(301)738-3120
Jack Miller	WRAMC	(202) 576-0089

INDIVIDUAL	AFFILIATION	TELEPHONE
Andy Moser	U.S. Fish and Wildlife Service	(301)269-6324
Bert Mueck	WRAIR	(202)576-3019
Art O'Connell	Maryland Department of the Environment	(410)631-3216
Jeanette Owens	Maryland Department of the Environment	(410)631-3400
Peter Perkins	WRAIR	(202)576-3719
Gary Pollicheck	U.S. Geological Survey	(410)828-1535
Constance Ramirez	U.S. Army - Historical Preservation Division	(202)727-7360
Kenneth Spencer	WRAIR	(202)576-3607
C Fred Tyner	WRAIR	(202)576-3607

9.0 PREPARERS

The following personnel, under a USAMRDC contract to Telemarc, Inc., provided instrumental technical assistance to the WRAIR in the preparation and review of this Environmental Assessment.

Technical Consultants

John R Beaver Telemarc, Inc.
PhD., Environmental Science Fairfax, Virginia
Beth A. Schaberg Telemarc, Inc.
M.S., Biology Fairfax, Virginia

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APPENDIX A BDRP ACTIVITIES AND CONTROLS TAKEN FROM THE BDRP FPEIS, SECTIONS 3.1 - 3.5

3. DESCRIPTION OF THE PROPOSED ACTION

3.1 INTRODUCTION

In section 2, the BDRP was defined from the perspectives of the mission objectives, program management, and sites of program execution. The proposed action under consideration in this DEIS is the continuation of the BDRP. The purpose of this DEIS is to identify and evaluate potential environmental impacts that might arise from the proposed action, and to consider reasonable alternatives. To this end, the BDRP was subdivided into discrete, functional activities that could be evaluated individually for their potential impacts. Activities intrinsic to the conduct of research, development, test and evaluation, as well as activities intrinsic to program administration and management, were identified and are discussed below.

Program activities are conducted in the context of numerous operational, safety, security and regulatory controls. These controls, in essence, define the "normal operating conditions" of program activities.. The program activities and their associated controls are an integral part of the Impact Analysis Matrix (JAM) (see Appendix 6), an analytical tool developed specifically for the identification of the potential environmental impacts of the BDRP. Although this FEIS evaluates a program, the program only has physical reality in the sites or facilities at which it is conducted. Thus, the primary and representative secondary sites f program execution were identified. The potential impacts of program activities as executed at various sites were evaluated by using the JAM. In addition, the potential impacts of program activities conducted in support of particular programmatic subject areas, the "Risk or Issue Categories," were analyzed similarly.

The program activities, controls, facilities and programmatic areas that constitute the BDRP are described here.

3.2 TYPES OF ACTIVITIES

3.2.1 RESEARCH, DEVELOPMENT, TEST AND EVALUATION

3.2.1.1 Laboratory Support Work

"Laboratory work" includes the handling of supplies and materials that are not unique to the particular subject of study in a given laboratory. This handling of supplies and materials, such as plasticware, glassware, non-hazardous chemicals and re agents, etc., is generally considered to be of very low intrinsic risk. The preparation of common reagents and solutions, such as culture media, buffer solutions, etc., is included in this activity. The maintenance of laboratory equipment either within a general use laboratory, or after appropriate decontamination and removal from a biosafety level 3 or 4 laboratory, is also included in this activity.

3.2.1.2 Storage of Chemicals, Biologicals, Supplies and Radioisotopes

Storage refers to the storage and maintenance of all laboratory supplies and materials in a BDRP facility. For items presenting little or no potential safety or environmental hazards, e.g. glassware, plasticware, spare parts, etc., ordinary storage units

and practices are employed. Specific storage procedures and requirements are employed for particular classes of chemicals, such as heavy metal salts, acids, bases, organics, and chemicals subject to regulation as hazardous materials or RCRA hazardous wastes. Storage units, procedures, and practices for biological materials are tailored to requirements for maintenance of biological activity of the material in question, as well as to the biohazard classification of the material (30). The small quantities of radioisotopes used in BDRP studies are stored in a manner that will preserve the biological activity of the labeled compounds, as well as meet NRC regulatory requirements for storage and handling of radioisotopes.

3.2.1.3 Conduct RDT&E-Specific Procedures

This activity includes all use and handling of BDRP -specific microorganisms and tomes, from removal from storage through performance of experimental or test procedures, decontamination of the spent materials, the equipment and/or laboratory, and disposal of the biological materials. The transportation of biological materials into and out of the facility is included in this activity, because the special requirements for transportation of biohazardous organisms and toxins parallel the requirements governing their use in a laboratory.

3.2.1.4 Laboratory Animal Care and Use

This activity is segregated from the "Procedures" activity because the use of animals in biomedical research has been identified by the public as a controversial issue in and of itself, if not in relation to the BDRP. This activity includes all aspects of the use of laboratory animals in BDRP research and testing The identifiable phases of laboratory anneal use are: receipt and holding of animals, assessment of the health status of the anneals, caging, feeding and watering of animals, use of the animals in experimental or test protocols, and disposal of animal remains and bedding.

3.2.1.5 Prototype Development of RDT&E Matenals

A prototype is an operational model suitable for evaluation of the design, performance, or production potential of a particular item. The activity described here is the development of prototypes of all RDT&E materials related to the BDRP. This includes the development, for the purpose of protection from biological threat agents, of personal protective equipment, such as masks, and development of detector systems for identification of biological agent threats. The development of protective vaccines or immunogens, and development of potential therapeutic drugs is also included in this activity.

3.2.1.6 Testing

Developmental testing of BDRP prototype materials is described by this activity. The biological material prototypes, such as vaccines, are tested in human volunteers. Such testing is conducted in full compliance with PDA and DA regulations governing the participation of human subjects in medical research. Equipment prototypes are tested

within laboratory chambers for performance to operational specifications. Detection and personal protection equipment prototypes may be tested, as required, at the DPG m open-air tests with nonhazardous, non-toxic, biological simulants.

3.2.2 ADMINISTRATION AND MANAGEMENT

3.2.2.1 Facilities Operations and Maintenance

This activity includes operation, maintenance, and repair of all facility systems such as water, wastewater, steam, electrical, telephone, heating and air conditioning. Routine structural repairs and maintenance of the building and its grounds, including routine cleaning, are included. The operation and maintenance activities for facility operations within the BDRP are similar to common practices employed throughout the commercial and industrial medical field.

3.2.2.2 Waste Stream Management

This activity includes the management, treatment, control and monitoring of effluents resulting from BDRP activities, regardless of source. Effluent air includes exhausts from buildings, laboratories, biosafety cabinets, heating, and incinerator discharge stacks. Management, control, treatment and monitoring of sanitary wastewater and contaminated laboratory wastes are included in this activity. Handling, storage, and disposal of liquid hazardous and toxic material are included as well. Liquid hazardous or toxic materials are as designated by the various states and by the U.S. Environmental Protection Agency. Sanitary wastewater includes general wastewater and noncontaminated laboratory wastewater. Contaminated laboratory wastewater results from procedures involving tomes or hazardous organisms, and includes shower, lavatory, and floor drain discharges from maximum containment laboratories. Management of the solid waste stream includes the handling, storage and disposal of refuse and discarded solid wastes generated by BDRP RDT&E activities. Discarded solid wastes include supplies, materials, chemicals, equipment, and animal wastes. Biohazardous wastes are decontaminated or detoxified before entry into the waste stream.

3.2.2.3 Planning and Designing Systems

This activity describes those BDRP efforts that involve the preparation of test methods for equipment, and the preparation of test methods for biological and biomedical research. It includes the planning and design of experimental and test methodologies for medical and physical protective systems as well as the overall planning of a project at the program task and sub -task levels. General planning activities include paperwork, idea formation, and activities requiring mental effort on the part of the professional staff.

3.2.2.4. Program Management

Activities in this category include management, accountability, and projection of the BDRP budget; administration of personnel and program activities; and review, analysis and planning of program objectives to achieve mission objectives. The primary sites are

responsible for program management and implementation with respect to the secondary sites. Thus, an additional program management activity of primary sites is the administration of contracts and other instruments used to support the secondary sites. Program management includes administrative decision-making as it specifically applies to RDT&E operations and program development. The publication of program accomplishments and results in specialty publications, as well as in public documents, e.g. the Congressional Descriptive Summary, is identified as a program management activity.

3.3 CONTROLS

At least four major classes of controls govern the conceptual and physical conduct of activities comprising the BDRP. These operational, safety, security, and regulatory controls, described below, ensure the safe handling of potentially hazardous biological materials as well as compliance with federal, state and local laws, regulations and policies. The descriptions of these controls are not necessarily comprehensive, but are intended to indicate some of the types of controls in effect throughout every aspect of the BDRP.

3.3.1 OPERATIONAL

3.3.1.1 Physical Plant: The physical plant provides an important secondary barrier for protection of the environment from potentially hazardous biological materials used within a facility. Primary protective barriers are used within the individual laboratories and are addressed in the Safety section. The operational features of the physical plant that provides protection to the environment (both internal and external) include: air handling systems appropriate to the levels of the potential biological hazards used in the facility; emergency power backup systems that would serve to maintain equipment serving primary barrier functions during a power failure; and the overall engineering of the facility, e.g. placement of air intakes and exhausts, adequacy of power systems, isolation of laboratory vacuum lines from other aspects of the air system, traps in the drainage system, etc. Recommendations for the design of biological containment laboratories for biohazard levels 3 and 4 work are specified in detail in the publication "Biosafety in Microbiological and Biomedical Laboratories" (5). The most important features of containment laboratory design are the provision for controlled access, specialized ventilation systems, and sealed openings into the laboratory. The specialized ventilation systems maintain laboratory air pressure negative to the immediate surroundings (i.e., air flow is into the laboratory rather than out of it), the exhaust air from the laboratory (BL-4) is filtered through HEPA filters or incinerated, and alarm systems provide immediate notification if air handling systems malfunction. Routine surveillance and maintenance of the facility's systems, and testing of backup systems, are required for effective functioning of the physical plant as a secondary barrier (see Appendix 12).

3.3.1.2 Waste Stream: Management of the solid and liquid waste streams in accordance with RCRA, Clean Air and Water Acts, and federal, state, and local standards is critical to protection of the environment. State or local governments often require that research and development facilities secure separate permits or certifications for discharge of their liquid and solid wastes. At a minimum, potentially hazardous laboratory wastes are segregated from sanitary waste to allow appropriate monitoring of the laboratory wastes.

For work with biological materials that pose potential hazards to the environment, both solid and liquid laboratory wastes are routinely pretreated to render them nonhazardous. Pretreatment methods include autoclaving of solid and/or liquid wastes to heat-inactivate biologically hazardous materials, and chemical inactivation of liquid wastes (with appropriate subsequent consideration of disposal of the chemical agents used for decontamination). Monitoring and testing of pretreated wastes serve to assure that they have been rendered nonhazardous. Depending on the location of a given facility, laboratory solid wastes are disposed of either by incineration or burial in landfill (for disposal of certain materials, pathological incinerators, or hazardous materials landfills) operating under appropriate permits or licensure.

3.3.2 SAFETY

Since the preparation of the DEIS, the Director of Defense Research and Engineering issued a policy on DoD research activities in the BDRP. This policy formalized the requirement that all efforts in the BDRP be conducted in compliance with the CDC-NIH Guidelines: Biosafety in Microbiological and Biomedical Laboratories, and further established the requirement that compliance with this guideline be included as a prerequisite in BDRP contracts. The USAMRDC, the only component of the BDRP supporting work at secondary sites that requires the use of BL-3 or BL4 laboratories, has implemented the DoD directive by establishing formal requirements in contracts for compliance with the Guidelines as well as for pre-award and post-award laboratory inspections.

The Army has initiated efforts to clearly identify the Army Safety Office, a subordinate function of the Office of the Chief of Staff, as the focal point for safety in the BDRP. In order to clarify and codify the responsibilities for safety throughout the program, the Army Safety Office has drafted two documents: - an Army regulation on "The Army Biological Defense Safety Program," and a supporting Army Pamphlet that provides the technical information necessary for conduct of the safety program. The regulation will go into effect after formal review and approval.

3.3.2.1 Regulations: Numerous national and state regulations on the safe handling of specific hazardous materials apply to the BDRP. Occupational Safety and Health Administration (OSHA) regulations (29 CFR) apply primarily to employee safety with regard to ambient air quality and presence of toxic and/or carcinogenic materials. NIH Guidelines for Research Involving Recombinant DNA Molecules (31) have the force of law when the work conducted is supported by NIH funds. The DoD voluntarily adopted and mandated compliance with the NIH guidelines for all DoD -sponsored activities (DoD laboratories as well as contractors) involving genetic engineering (32). The Nuclear Regulatory Commission (10 CFR Ch. 1) regulates the use, handling and disposal of radioactive materials (primarily compounds containing very low energy isotopes) used in the BDRP. U.S. Food and Drug Administration guidelines and regulations (21 CFR) (for example, "Good Laboratory Practices") apply to research conducted in support of application for licensure of new drugs, vaccines or pharmaceuticals. The U.S. Department of Agriculture regulates the importation, possession, and use of animal and plant pathogens under authority of the Virus-Serum-Toxin Act (21 USC 151-158). The EPA, under the

Toxic Substances Control Act, has ruled that genetically engineered microorganisms are chemical substances subject to the provisions of that Act for the purposes of manufacture, public distribution or significant new use. Other public laws and federal regulations govern the participation of human volunteers in biomedical research.

3.3.2.2 Institutional Approval: Certain institutional approval authorities are mandated by policy or regulation. These include, for example, an Institutional Biosafety Committee for review of research using recombinant DNA, and Radiation Safety Committees for review and approval of use of radioisotopes in biomedical research. Additional institutional approval authorities include committees governing the use of laboratory animals in research and research using human volunteers. The Institutional Biosafety Committees often have an extended mandate to review and approve all institutional research involving potentially hazardous chemicals, organisms or toxins Frequently, two separate biosafety and/or health and safety committees oversee recombinant DNA work and other work involving biohazardous materials, respectively. Periodic laboratory inspections for compliance with various regulations are conducted by internal or external reviewers, depending on the subject of the inspection. It should be noted that funding authorities, such as the NIH, DA, National Science Foundation, and numerous other private foundations that support biomedical research, all require requests for research support to be formally approved by authorized institutional officials. If work with animals, recombinant DNA, humans, or radioisotopes is involved, documentation of appropriate approvals must also be provided before any funds are awarded. Questions as to suitability of facilities or personnel are resolved by site visits prior to the award of funds.

3.3.2.3 Professional Standards: Professional standards and guidelines for the safe conduct of biomedical research are promulgated by venous agencies and organizations Examples of such standards are the NIH Laboratory Safety Monograph (33) and the CDC-NIH publication Biosafety in Microbiological Laboratories (5). Specialized areas in which individuals and/or laboratories must receive certifications before performing in a professional capacity include clinical laboratory technology, pathology, radiology, etc. In addition, many professional societies offer training courses and guidance in technical standards that are readily available to researchers at all levels. At the institutional level, compulsory employee orientations, provision of safety handbooks, and training in the use of isotopes, animals, specialized equipment, biosafety procedures, and emergency responses serve to promulgate and reinforce safe laboratory practices. On-the-job training of individuals involved in research and implementation of local standard operating procedures facilitate the maintenance and dissemination of professional standards. As appropriate to the level of biohazard work teeing conducted, worker protection is furthered by the provision of laboratory garments (lab coats, scrub suits, etc.), gloves, masks, respirators, and equipment (for example, automatic pipettors) designed to isolate the worker from the biological materials. Work conducted at the BL-3 or BL-4 level is conducted in a laboratory specifically designed and equipped to meet those biosafety standards (5). Thus, while there is no single codified set of professional standards applicable to the conduct of research in the BDRP, many specialized standards for the use of infectious organisms, and performance of various laboratory techniques and procedural methods exist and are accepted and followed throughout the biomedical research community.

3.3.2.4 Laboratory Design and Practices: The CDC-NIH publication "Biosafety in Microbiological and Biomedical Laboratories" (5) describes of standard and special microbiological practices, safety equipment and facilities that constitute Biosafety Levels 1-4 (BL1 -4), which are recommended for working with a variety of infectious agents in various laboratory settings (see Appendix 12). Two elements of containment for infectious agents are described. Primary containment, which is designed to protect personnel and the immediate laboratory environment, includes use of good microbiological technique, i.e. maintenance of sterility and reduction of incidental aerosols, and use of appropriate safety equipment, e.g. Biosafety cabinets (see Appendix 11), sealed and vented centrifuges, etc. Secondary containment, designed to protect the environment external to the laboratory from biohazardous organisms, is provided by facility engineering features and operational practices.

In addition to these Biosafety guidelines, the Laboratory Safety Monograph (33) published by the NIH as a supplement to the NIH Guidelines for Recombinant DNA Research (34) describes detailed relevant laboratory practices, containment equipment, special laboratory design and roles and responsibilities. The guidelines for detailed laboratory practices include selection of laboratory techniques for biohazard control, personal hygiene habits and practices, protective clothing "and equipment, housekeeping, decontamination and disposal, care and use of laboratory animals, and protection of vacuum systems when filtering biohazardous materials. The detailed descriptions of containment equipment include selection of biological safety cabinets and certification procedures. The details of special laboratory design include specifications for BL3 and BL4 facilities and their certification procedures. The roles and responsibilities section includes guidelines for the institutional Biosafety committee, the biological safety officer, emergency procedures, medical surveillance, and training aids, materials and courses. A book in preparation by the National Academy of Sciences, National Research Council titled "Biosafety in the Laboratory: Prudent Practices for the Handling and Disposal of Infectious Materials" presents comprehensive guidelines covering all facets of the operation of a laboratory in which human pathogens are handled. This peer-reviewed treatise incorporates the CDC-NIH guidelines and extends the recommendations in the Laboratory Safety Monograph (33) to all activities that involve infectious organisms other than those specifically involving recombinant DNA.

While the guidelines described above apply to work performed with infectious organisms, no similar set of national guidelines yet exists for the handling of toxins of biological origin. Standard Operating Procedures are developed locally for the handling, use and disposal of toxins, as appropriate. However, guidelines for the safe handling of botulinum toxin and the organism that produces it, Clostridium botulinum, are specifically described in the CDC -NIH Biosafety guide (5). (Recommended containment levels are BL-2 or BL-3 depending upon amounts of material used and specific procedures performed.) Because botulinum toxin is one of the most potent of the known biological toxins, the principles of good laboratory biosafety and containment described for this toxin serve as good guidelines for laboratory work with other equally or less potent toxins.

3.3.2.5 Good Judgment: The essence of good judgment in any research activity is the protection of oneself, others in the laboratory, the environment (both internal and

external), and lastly, the experimental material. researchers and other laboratory personnel have a vested interest in their own health and safety. As a rule of thumb, when there is uncertainty as to the appropriate level of protective measures for a given situation, the highest available level of primary protective barrier is employed. An example of implementation of this policy is handling of a potentially hazardous blood sample a biosafety cabinet while wearing surgical gloves, rather than handling such material on an open bench with bare hands. Good judgment extends also to conscious efforts to minimize the potential for accidents, and seeking guidance from standards or experts when confronted with unusual situations.

3.3.3 SECURITY

- 3.3.3.1 Laws and Regulations: Depending upon the location and ownership of a given facility, local, state and/or federal laws govern the security of that property. These laws and regulations pertain to trespass of unauthorized individuals, physical damage to property, theft of property, and violation of the owner's rights. Laws and regulations typically allow property owners to bar the general public from unauthorized entry to a facility and to place physical barriers for prevention of entry.
- 3.3.3.2 Enforcement: Depending upon jurisdiction, local, state or federal law enforcement officials uphold and execute the laws pertaining to property security for a given facility. In addition, personnel employed in a facility are charged with the responsibility to notify appropriate officials if they observe violations of relevant laws.
- 3.3.3.3 Physical security: Several levels of physical security, although Implemented primarily to enhance property security, contribute to the overall safety of the BDRP. Many facilities have perimeter controls, where public access is regulated through manned gates. Facility doors are locked after working hours, on holidays, and weekends. Doors to laboratories are similarly locked during non -working periods. Biologically hazardous materials are stored in appropriate units (cabinets, refrigerators, freezers) to which access is controlled by a system of locks. Many facilities have implemented, or plan to implement, personnel access controls in the form of computer -controlled facility access systems (such as magnetic card key systems), which only permit passage of an employee to designated areas, and further, provide an alarm system and audit trail for monitoring access violations. Guidelines for BL -3 and BL-4 laboratory operations contain additional specifications on control of access to the laboratory and access to hazardous infectious organisms (see Appendix 12).

3.3.4 REGULATORY CONTROLS

3.3.4.1 Controlled and Hazardous Substances: Federal regulations and common carrier tariffs have been enacted to ensure the safe transport of hazardous biological materials. U.S. Public Health Service (USPHS) regulations (42 CFR 72) specify packaging and labeling requirements for etiologic agents (see Appendix 2). The U.S. Department of Transportation (D.0.T.) regulations (49 CFR 173) contain additional requirements for packaging, and the U.S. Department of Agriculture (USDA) regulates animal (and plant) pathogens (9 122). The U.S. Food and Drug Administration (FDA) regulates the use,

handling and shipment of biological products (21 CFR and 600 -800). In addition, U.S. Dept. of Justice, Drug Enforcement Administration, regulations (21 CFR Ch. II) list four classes of controlled substances for which use licenses are required, and to which specific DOT regulations apply.

- 3.3.4.2 Congressional: The U.S. Congress, through the budget authorization and appropriations process, controls all funds used to support the BDRP (see section 2.3 for discussion of program elements, projects, and tasks). An annual report on Chemical Warfare -Biological Defense Research Program Obligations is presented to Congress at the end of each fiscal year. In addition, an annual Research, Development, Test and Evaluation (RDT&E) Congressional Descriptive Summary, covering the various RDT&E DoD mission areas, is presented. The BDRP is identified discretely in the RDT&E achievements and fiscal analyses that are presented in this latter report.
- 3.3.43 National Policy and the Biological Weapons Convention: The U. S. formally renounced the "use of lethal biological agents and weapons, and all other methods of biological warfare" in National Security Decision 35, November 25, 1969. In National Security Decision 44, dated February 20, 1970, the U.S. renounced "offensive preparations for the use of toxins as a method of warfare, and reiterated that "the U.S. will confine its military programs for toxins, whether produced by bacteriological or any other biological method or by chemical synthesis, to research for defensive purposes only, such as to improve techniques of immunization and medical therapy." In 1972, the U.S. signed the Biological Weapons Convention (Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction). Appendix 1 contains excerpts of these documents. The U.S. Senate ratified the Biological Weapons Convention in 1975. The BDRP is conducted in full cognizance of and compliance with these national policies and the BWC.
- 3.3.4.4 Army Regulations: Army Regulations (ARs) provide specific guidance and implementation of applicable federal regulations, public laws, and DoD policies. In addition to ARs, numerous technical bulletins and local implementations of ARs provide guidance on specific policies and procedures. Two major groupings of Army regulations (ARs) contain individual regulations that govern, in whole or in part, various aspects of the BDRP. The two major AR series are Medical Services (AR 40 series) and Research Development, and Acquisition (AR 70 series). The most important regulations from these two series, as well as miscellaneous pertinent regulations, are listed below.

AR 40 Series - Medical Services

40-1	Composition, Mission and Functions of the Army Medical Department
40-7	Use of Investigational Drugs in Humans and the Use of Schedule I Controlled Drug
	Substances
40-10	Health Hazard Assessment Program in Support of the Material Acquisition Decision
	Process

40-12	Medical and Agricultural Foreign and Domestic Quarantine
	Regulation for Vessels, Aircraft and Other Transports of Armed
	Forces
40-14	Control and Recording Procedures for Exposure to
	Ionizing and Radioactive Materials
40-24	Medical Laboratory Activities
40-38	Clinical Investigation Program
40 56	Introduction Requirements Determination and Publication of New
	Type Classified Medical Items Into the Department of Defense
40-60	Policies and Procedures for the Acquisition of Medical Material
40 61	Medical Logistics Policies and Procedures
. D = 0 = .	
AR 70 Seri	es - Research, Development and Acquisition
70-1	Systems Acquisition Policy and Procedure
70-5	Grants to Nonprofit Organizations for Support of Scientific Research
70-6	Management of the Research, Development, Test and Evaluation
	Army Appropriation
70-10	Test and Evaluation During Development and Acquisition of
	Material
70-11	Dissemination of Scientific and Technical Information
70-14	Publication and Reprints of Articles in Professional Journals
70-17	System, Program, Project, Product Management
70-18	The Use of Animals in DoD Programs
70-25	Use of Volunteers as Subjects of Research
70-26	Department of the Army Sponsorship of Unclassified Scientific
	or Technical Meetings
70-35	Advanced Planning Infor mation for Research and Development
70-59	Department of Defense Tactical Shelter Program

Management of Controlled Substances, Ethyl Alcohol and Hazardous Biological Substances in Army Research, Development, Test and Evaluation Facilities
 Major Range and Test Facility Base
 Nuclear, Biological and Chemical Contamination Survivability of Army Material
 Production Management
 Independent Research and Development

Miscellaneous

AR 190-50 Physical Security for Storage of Controlled Medical Substances and Other Medically Sensitive Items

AR 190-52 Security of Army Property at Unit and Installation Level

AR 190-52 Countering Terrorism and Other Major Disruptions on Military Installations

AR 385-10 Army Safety Program

AR 385-40 Accident Reporting and Records

AR 740-32 Responsibilities for Technical Escort of Dangerous Materials

3.4 FACILITIES SUPPORTING THE BDRP

3.4.1 Primary Sites

The primary DA sites at which BDRP activities are conducted are described in section 5.2.2 and Appendix 5. The RDT&E activities associated with the Program are conducted in specific laboratory facilities at each of these sites. Depending upon the types of microorganisms or toxins used, and the nature of the research or testing conducted, the individual facilities are specially designed and equipped to meet the biosafety level standards described in Appendix 12. For example, USAMRIID, the lead laboratory for medical defensive studies, contains laboratories designed and equipped at biosafety levels 1 through 4. The nature of the BDRP activities conducted by CRDEC requires laboratories that function only at biosafety levels 1 and 2. The Baker Laboratory Complex, DPG, currently performs laboratory developmental testing studies that require only biosafety level 2 facilities. The outdoor grid testing areas at DPG are used in tests with

simulants in support of the BDRP only in response to specific material developer requirements, and only after preparation of appropriate NEPA documentation.

3.4.2 Secondary Sites

Representative secondary sites where BDRP studies are conducted are described in sections 5.23 and Appendix 5. Appendix 3 lists all secondary sites supported by the BDRP, current as of January 1, 88. Secondary sites supported by the BDRP all contain existing facilities appropriate for the particular BDRP studies conducted at that site. As a general policy, the BDRP does not support the construction *of* new facilities at secondary sites. Laboratory operations are conducted by established organizations within enclosed facilities where all waste streams are managed in compliance with existing laws and regulations. The majority of secondary sites provide only general laboratory facilities, where studies of microorganisms or toxins requiring only biosafety levels 1 or 2 containment are conducted. A small number of secondary sites provide biosafety level 3 laboratory facilities for performance of BDRP-supported studies.

3.5 POTENTIAL RISK/ISSUE CATEGORIES

The BDRP can be subdivided into several subject area categories relating to identifiable potential risks to the health and safety of the workforce or the environment, as well as to areas of public controversy. This programmatic perspective provides a useful and realistic basis for the analysis of potential impacts on the environment that might arise from the BDRP. A detailed discussion of each risk/issue category is presented in Appendix 4, and BDRP sites were identified according to these categories (by corresponding Roman numeral) in Appendix 3.

Many of the BDRP research and development efforts are similar, or parallel, to research and development efforts conducted in universities and research institutes throughout the U.S. and in other countries. At the level of the most basic research efforts, BDRP research is virtually indistinguishable from that conducted and sponsored by the National Science Foundation, National Institutes of Health (NIH), and the Centers for Disease Control (CDC). It is only when the research effort is carried into the phase of product development (e.g., vaccines, detectors) that the effort can be identified as one that is clearly of less general interest to the civilian sector than to the DoD. Nonetheless, both civilian and military biomedical product development involve the use of similar laboratory techniques and materials, including organisms, toxins, genetically engineered microorganisms (GEMs), etc. The general procedures, risks, safeguards, and potential environmental consequences are the same, regardless of the organization sponsoring the effort.

The NIH developed guidelines (34) for recombinant DNA research under the auspices of the National Environmental Policy Act (NEPA) (7,35) and other federal statutes. These guidelines established the minimum standards for laboratory safety, including procedures, equipment, and facilities appropriate for safe conduct of recombinant DNA research (33). The guidelines have been modified over the past decade (37-39) to reflect research experience and public input, which are incor porated in the most recent guidelines, published May 7, 1986 (31). The NIH and CDC jointly published guidelines

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that detail the laboratory procedures, safety equipment, and facilities design required for the safe conduct of research with pathogenic organisms (5). The DoD implementations of the NIH and CDC guidelines require laboratory procedures and containment facilities that meet or exceed these federal standards (32).

The most probable biological warfare threat to U.S. forces is an attack with ae rosols of biological agents. Thus, the BDRP efforts differ from those conducted by most non-DoD organizations in the requirement for the use of aerosol challenges in the preclinical phase of vaccine and drug development, or aerosol testing in the development of protection, detection and decontamination systems. In the civilian sector, aerosol test systems are used primarily in the study of communicable diseases transmitted by the aerosol route, such as influenza, and in the development of aerosol forms of therapeutic drugs, for example, various aerosol asthma therapies and aerosol Virazole for treatment of respiratory syncytial virus infection in infants.

3.5.1 High Hazard Organisms (I)

This subject category includes all laboratory activities with organisms for which biosafety levels 3 and 4 containment are recommended by the CDC-NIH guidelines (5). In addition, for laboratory procedures with BL-2 organisms that pose potentially greater risks to workers or the environment, e.g. possible generation of aerosols or use of highly concentrated preparations of organisms, the next higher biosafety level, BL-3, from that generally recommended for a particular organism is used and given consideration in this category.

3.5.2 Genetically Engineered Microorganisms (GEMs) (II)

GEMs do not constitute a programmatically defined category per se because genetic engineering is not a discrete object of study, but rather is considered a state of the art tool to be applied to attaining specific research objectives. This topic is given separate identification here primarily because of the public perception of special environmental risks associated with GEMs. In addition, segments of the BDRP can be identified as including, or potentially including, use of genetic engineering or genetically engineered microorganisms in the research and development endeavor. The NIH has published an environmental impact statement (7,35,37,38) specifically addressing the issue of GEMs and research involving recombinant DNA molecules. Thus, the analysis of the potential impact of GEMs and their associated methodologies on the environment presented in this DEIS is restricted to the context of the BDRP.

3.5.3 Toxins (III)

This category includes all toxins, as well as potentially toxic substances of biological origin such as bioregulators. Laboratory work with toxins may pose risks to an exposed individual, but unlike infectious microorganisms, toxins are not living entities and do not propagate themselves in a host or in the environment. Although there are no nationally recommended biosafety levels for work with toxins per se, the CDC-NIH guidelines (5) recommend biosafety level 2 for most work conducted with Clostridium botulinum, the bacterium that produces the potent botulinum neurotoxin. In addition, appendix F of the

NIH Guidelines for Research Involving Recombinant DNA Molecules (31) addresses the -appropriate levels of biosafety for use in cloning toxic molecule genes. For the most potent classes of toxins, biosafety levels 2 or 3 are recommended, depending upon the biological containment (host -vector) system used. Unless there are procedures that would pose an increased risk to the laboratory worker, such as potential for creation of aerosols or work with highly concentrated materials, work with toxins is appropriately conducted at biosafety level 2 (see Appendix 12). In the case of procedures with toxins or toxic molecules requiring more stringent containment measures and higher biosafety levels, consideration was given in the analysis under the high hazard organisms category.

3.5.4 Low Hazard Organisms (IV)

This subject area includes all low hazard organisms, which are defined by the CDC as including a broad spectrum of indigenous microorganisms present in the community and associated with human disease of varying severity (e.g., communicable diseases), as well as organisms present in the environment and not known to cause disease in healthy adult humans (5). By definition, the low hazard organisms pose far less potential risk to the workforce and to the environment than the high hazard organisms. Organisms in this category are incorporated into the program whenever and wherever they can be used and still give meaningful results. Organisms used as simulants in testing of physical protective devices belong to this category.

3.5.5 Rapid Diagnosis and Detection (V)

This subject area was defined separately because it is a major identifiable program area that is of overall low-risk potential to either human health or the environment. The development and design of detection equipment, development of assay systems, and associated use of non-hazardous and non-toxic biological materials are considered in this category. Where development of reagents for testing of products and/or equipment would involve use of infectious agents or toxins, the analysis or environmental impact for this subject area was considered under those higher risk categories as appropriate.

3.5.6 Vaccine and Drug Therapy Development (VI)

This subject area is a major identifiable element of the BDRP in which the potential risks or impacts are of a markedly different nature than those evaluated under the high -hazard organisms or toxin categories. This subject area includes only the preclinical and clinical testing of anti -agent drugs, i.e. antiviral drugs, anti -tome drugs, and vaccines. The other research and development aspects of drug and vaccine development involving use of infectious agents or toxins are covered under one or more of the other subject area risk categories.

Phase III human clinical testing of drugs or vaccines is conducted only where and when a target disease occurs naturally. Such human testing is conducted under appropriate controlled conditions meeting the human testing standards of the United States and of the country in which a study may be conducted. There is no introduction of an agent into the environment, and no additional risk to human or environmental health and safety over that which is a result of the occurrence of natural, endemic disease.

3.5.7 Other Program Research and Activities (VII)

This category includes those areas of the program that do not appropriately fit into one or more of the categories defined in sections 35.1-6, and that are likely to have imperceptible, if any, impact on the human or natural environment, and do not constitute discrete subject areas warranting separate consideration. Examples of these sorts of activities are literature studies, purification of immune plasma, and handling of non-hazardous biological laboratory materials.

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APPENDIX B ANALYSIS OF PROGRAMMATIC RISK/ISSUES TAKEN FROM THE BDRP FPEIS, APPENDIX 4

APPENDIX 4 - ANALYSIS OF PROGRAMMATIC RISKS/ISSUES CONTENTS

SECTION

- 1.
- High hazard organisms Genetically engin eered microorganisms 2.
- 3. Toxins
- 4.
- Low hazard organisms Rapid diagnosis and detection 5.
- 6.
- Vaccine and drug therapy development
 Other program research and development activities 7.

1. High Hazard Organisms

1.1 Introduction

A number of factors influence the determination of an appropriate biosafety level for work with a particular organism. Among the factors that must be considered for a given organism are: virulence, pathogenicity, biological stability, route of spread, communicability, nature or function of the laboratory, the procedures and manipulations involving the organism, quantity and concentration of the organism, endemicity of the agent, and availability of effective vaccines or therapeutic measures.

The assignment of microorganisms to the category requiring BL-3 practices, safety equipment, and facilities is based on one of the following criteria, as stated in the CDC -NIH guide (1): overt laboratory-associated infections have occurred by aerosol route if protective vaccines are not used or are unavailable; or laboratory experience with the organism is inadequate to assess risk and the natural disease in humans is potentially severe, life threatening, or causes residual damage. Similarly, the assignment of an organism to the category of agents requiring BL4 containment is based on documented cases of severe and frequently fatal naturally occurring human infections and aerosol -transmitted laboratory infections.

The data upon which these classifications of organisms are based were accrued over years of operation of microbiological research and clinical laboratories throughout the world. Since the early 1900's, reports of laboratory-acquired infections have been published in the biomedical literature. Several systematic surveys of laboratory-acquired infections have been conducted in the past 40 years. Efforts initiated under the auspices of the World Health Organization in the late 1950's to codify the taxonomic relationships of the arthropod-borne viruses resulted in the ongoing publication of the "International Catalog of Arboviruses Including Certain Other Viruses of Vertebrates" by The American Society of Tropical Medicine and Hygiene (ASTMH). This Catalog provides descriptions of those viruses biologically transmitted by arthropods in nature (or thought originally to be transmitted by arthropods), and actually or potentially infectious for humans or domestic animals. A subcommittee of ASTMH, the Subcommittee on Arbovirus Laboratory Safety (SALS), assessed documented arbovirus infections of laboratory workers. In 1980, SALS published recommended levels of practices and containment for all viruses listed at that time in the Catalog (2). The SALS committee activities are ongoing; information on newly discovered viruses is evaluated so that appropriate biosafety levels for work with those viruses can be determined.

Certain bacteria and rickettsia are classified as BL -3 or BL-4 organisms on the basis of criteria similar *to* those applied *to* viruses, i.e., known laboratory infections, infectivity by the aerosol route, stability, etc. For virtually all of the bacteria and rickettsia of interest in the BDRP, BL -2 containment and practices are recommended for handling quantities on the order of those used in routine clinical diagnostic procedures. However, BL-3 containment,

equipment, and practices are recommended for handling of the same organisms in procedures that potentially create aerosols, or when handling larger quantities.

The viruses, rickettsia, and bacteria used in the BDRP are capable of causing infections in humans, but these infections are not classified as communicable diseases because their natural mode of transmission is not from human to human (see Appendix 7). Representative organisms belonging to the groups classified as requiring BL-3 or BL-4 containment and procedures, for some of the types of procedures conducted with them in the BDRP, include the following:

Rickettsia: Coxiella burnetii (Q fever)

Bacteria: Francisella tularensis (tularemia, "Rabbit Fever") Bacillus anthra cis

(anthrax) Clostridium botulinum (produces botulinum toxin)

Viruses: Chikungunya, tick -borne encephalitis, Hantaan, Rift Valley fever, Venezuelan equine encephalomyelitis, Yellow Fever, Junin, Ebola,

Crimean - Congo hemorrhagic fever, Lassa, Machupo.

1.2 Types of Studies Conducted Using High Hazard Organisms

Basic research studies of disease pathogenesis of both in vitro and animal models are conducted using the organisms described above. In addition, efforts to develop vaccines for these organisms range from basic research to human clinical trials of safety and efficacy. The development of antiviral drugs and therapies similarly involves studies from the basic research level through hum an clinical trials for efficacy in treatment of viral diseases. Laboratory testing of personal protective materiel, decontamination systems detector methodologies, and rapid identification and diagnosis methodologies requires the limited use of high hazard organisms to verify specificity.

1.3 Rationale for the Use of High Hazard Organisms in the BDRP

Because the primary concerns, from the standpoint of potential biological warfare threats, are organisms such as those listed above, and exposure by small particle aerosol, defensive research and development efforts must employ small quantities of the actual biological materials in order to develop and test the efficacy of vaccines, drugs, and therapies. A vaccine to a simulant or to a "model," low hazard organism or toxin would be of no value to the national defense posture. Similarly, the ability to detect or to protect against a harmless organism is of little value.

1.4 Environmental, Health and Safety Considerations

As required by the nature of the procedures being performed, studies of high -hazard organisms a re conducted in BL-3 and BL-4 laboratory facilities, described in Appendix 12. These "maximum laboratory containment" facilities, equipment, and procedures are

recommended in the CDC-NIH guide to biosafety (1), and are explicitly intended to provide protection to the laboratory worker as well as to the human environment in general.

The following vaccines are available (1) and are used to immunize at -risk laboratory personnel:

Q fever vaccine, tularemia vaccine, anthrax vaccine*, pentavalent botulinum toxoid (serotypes ABCDE), Rift Valley fever vaccine, Venezuelan equine encephalomyelitis vaccine (TC -83 and TC-84), Yellow fever vaccine* (17D), vaccinia*, tick -borne encephalitis.

Immune globulin, antibiotics, or antiviral drug treatments are available for use (1,4) in treatment of Q fever, tularemia, anthrax, botulinum intoxication, hemorrhagic fever with renal syndrome (caused by Hantaan virus), Junin hemorrhagic fever, and Lassa fever.

1.5 Waste Materials

A detailed description of the elaborate procedures required for removal and disposal of materials from BL-3 and BL-4 laboratories is presented in Appendix 12 All infectious or potentially infectious materials are killed by autoclaving prior to disposal. All residual botulinum toxin or toxic -containing materials are inactivated with alkali prior to disposal -.

1.6 Security

Seed stocks or cultures of BL-3 and BL-4 organisms are stored in multi-walled, leak-proof containers in locked freezers which are in locked rooms located in locked biocontainment laboratories to which access, even to the outer room, is limited to authorized personnel. The security provisions for BL-3 and BL-4 laboratories, described in Appendix 12, apply to the general security for laboratory procedures with "working cultures" of the high hazard organisms.

* Licensed in the US. The other vaccines are available for use as Investigational New Drug (IND) products. Additional vaccines, e.g. Chikungunya (3), are in various stages of development.

1.7 Accidents and Incidents

Handling of highly infectious, pathogenic or exotic organisms always poses a potential risk to laboratory personnel. Thus, biosafety facilities, procedures and equipment, and vaccines, have been developed to minimize these risks. Since 1976, there have been no occurrences of overt disease in laboratory workers handling infectious organisms within BL -3 and BL-4 BDRP laboratory facilities, although in 1980, one focal infection with F. tularensis occurred at the site of a puncture wound. There have been laboratory accidents that resulted in potential exposures; however, prior immunization or immediate treatment with the appropriate therapy have averted the possible development of clinical disease (see Appendix 8). There have never been any occurrences of infections in non -laboratory

workers or in the general community arising from organisms handled in BL -3 or BL-4 facilities associated with the BDRP.

1.8 Program Benefits

The development of vaccines, drug therapies, detector methodologies, and rapid identification and diagnosis methodologies for potential biological warfare threat agents enhances the national defense posture with respect to these threats. Because many of the threat agents are also endemic disease hazards in certain areas of the world, the development of protective and therapeutic approaches for these diseases enhances the health status of peacetime forces stationed in such areas. For example, the development of an antiviral therapy for treatment of hemorrhagic fever with renal syndrome (Korean hemorrhagic fever), will potentially contribute significantly to the health and well -being of the local populace as well as to U.S. soldiers stationed in areas of the world where this disease is endemic. The results of the BDRP efforts with high-hazard infectious organisms contribute to a better understanding of the pathogenesis of many exotic disease on the part of the general scientific community, and to the peoples living in areas of endemic disease caused by these organisms.

2. Genetically Engineered Microorganisms (GEMs)

2.1 Introduction

Genetically engineered microorganisms are derived in the laboratory by removing a fragment of genetic information, a gene, from one organism and "cloning" this fragment into another organism, called the host, which is usually a bacteria or yeast. Cloning refers to a sequence of steps in which the gene of interest is inserted, using special enzymes, into a special, non -chromosomal piece of DNA called a plasmid, or vector. The vector, containing the foreign gene, is introduced into the host cell. Plasmid vectors are not part of the host cell genetic information, but when the host cell divides, the plasmid divides also. Under ideal conditions, the foreign genetic information carried in the plasmid is then transcribed into RNA, translated into protein, and secreted from the host cell. Another approach is to clone gene fragments of interest into a vaccine virus. Commercial applications of genetic engineering have resulted in the production of biomedical products, such as the hepatitis B subunit vaccine, human growth factor, human insulin, tissue plasminogen activator (TPA), interferon, and diagnostic antibodies, as well as veterinary and agricultural products, such as the swine pseudorabies vaccine and the frost -free Pseudomonas bacteria

Because genes carry information which can be transcribed and expressed as a particular protein, only products that are protein in nature can be cloned. Thus, it is not currently possible to clone molecules that belong to other biochemical classes, such as steroids, alkaloids, fatty acids, carbohydrates, etc. These classes of compounds are synthesized in complex series of enzymatic reactions and are not simply the product of a single gene.

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2.2 Types of Studies Conducted Using GEMs

Within the BDRP, genetic engineering is used in efforts to develop safer and more efficacious viral and bacterial vaccines as well as vaccines for protection against protein toxins, such as snake neurotoxins and botulinum neurotoxin. Through years of intensive effort, immunologists have discovered that antibodies, the molecules that fight infections and other foreign compounds introduced into the system, are extremely specific and can recognize even minute portions of a larger foreign molecule. Further studies have revealed that only small portions of the proteins on the surface of a virus, or small portions of a protein toxin, are necessary for the production of antibodies to that virus or toxin. Thus, vaccine development efforts focus on identification of those small portions of the viral, bacterial, or

toxin proteins responsible for immunity, and on cloning those small immunogenic portions (these are called epitopes) in order to produce quantities that would be useful in the research, development, and testing of new vaccines. Another approach, also used in the BDRP, is to clone the gene fragments coding for important epitopes into the vaccinia virus (smallpox vaccine virus) in the hope of developing a genetically engineered vaccinia vaccine that would confer immunity to two or more other viruses or toxins.

The following organisms and toxins are representative of the focus of BDRP efforts in genetically engineered vaccine development: Rift Valley fever virus, Lassa virus, lymphocytic choriomeningitis virus, yellow fever virus, anthrax (bacteria), botulinum toxin, crotoxin staphylococcal enterotoxin

2.3 Rationale for the Use of GEMs in the BDRP

Traditional vaccines used by both the military and civilian medical community fall into one of three categories: live, attentuated vaccines, killed organism vaccines, and inactivated toxin vaccines (toxoids). All three types of vaccines have intrinsic deficiencies. Live, attenuated vaccines cause an asymptomatic infection after administration, but for some vaccines, the rate of subacute and acute infection is undesirably high (e.g., influenza vaccines often produce a mild to serious flu-like syndrome in some recipients). Vaccines prepared from killed organisms often do not produce a highly effective immune response. Inactivated toxin vaccines, or toxoids, are generally prepared from crude materials and many of them are undesirably "reactogenic," meaning that they produce local reactions such as swelling, redness, and soreness at the site of injection. Thus, BDRP scientists use the modern approaches and techniques of genetic engineering in an effort to develop vaccines that obviate the difficulties and deficiencies of the traditional vaccines.

2.4 Environmental, Health, and Safety Considerations

The NIH, in the course of developing of the Guidelines for Research Involving Recombinant DNA Molecules (5,6), published an environmental impact statement (7) and environmental assessments (8) of the potential impacts of research with GEMs (see Appendix 10). In addition the Recombinant Advisory Committee and other scientists have published documents dealing with risk assessment of the use of recombinant organisms. The conclusions of these assessments and studies are that genetic engineering techniques and GEMs, when utilized under the conditions recommended in the NIH guidelines,

present no risk to the human environment. Appendix I of the NIH guidelines (6) describes the physical and biological containment levels recommended for use in recombinant DNA studies; these are also described in Appendix 10. Depending upon the nature of the gene being cloned, and the host-vector system employed, the recommended biocontainment levels for recombinant DNA work are either BL -2 or BL-3. These biosafety levels, discussed in Appendix 12, specify the laboratory facilities, procedures, and equipment appropriate for protection of laboratory workers and the environment from exposure to GEMs.

2.5 Waste Materials

A detailed description of the procedures required for removal and disposal of materials from BL -2 and BL-3 laboratories is presented in Appendix 12. All infectious or potentially infectious or toxic materials are killed by autoclaving or chemical inactivation prior to disposal.

2.6 Security

Seed stocks or cultures of BL-3 organisms used in BDRP studies involving genetic engineering are stored in multi-walled, leak-proof containers in locked freezers which are in locked rooms located in locked biocontainment laboratories to which access, even to the outer room, is limited to authorized personnel. The security provisions for BL-3 and BL-2 laboratories, described in Appendix 12, apply to the general security for laboratory procedures with "working cultures" of the high and low hazard infectious organisms.

2.7 Accidents and Incidents

Handling of highly infectious, pathogenic, or exotic organisms, including GEMs, always poses a potential risk to laboratory personnel. Thus, biosafety facilities, procedures, and equipment, and vaccines, have been developed to minimize these risks. Since 1976, there have been no occurrences of overt disease in laboratory workers handling infectious organisms within BL -2 and BL-3 BDRP laboratory facilities. Although in 1980, one focal infection with F. tularensis occurred at the site of a puncture wound. There have been laboratory accidents that resulted in potential exposures; however, prior immunization or immediate treatment with the appropriate therapy have averted the possible development of clinical disease (see Appendix 8). None of these potential exposures have involved GEMs. There have been no occurrences of infections or illness in non -laboratory workers or in the general community arising from infectious microorganisms, tomes or GEMs handled in BL -2 or BL-3 facilities.

2.8 Program Benefits

The development of-vaccines effective against potential biological warfare threat agents enhances the national defense posture with respect to these threats. Because many of the threat agents are also endemic disease hazards in certain areas of the world, the development of improved protective vaccines through the use of genetic engineering potentially enhances the health status of peacetime forces stationed in such areas as well as that of the local population. The results of the BDRP efforts with GEMs contribute to the scientific community in the area of vaccine development in general, and specifically in

the area of development of vaccines for and understanding the pathogenesis of exotic diseases or toxins.

3. Toxins

3.1 Introduction

The toxins studied in the BDRP are all derived natural sources, and are thus designated "toxins of biological origin. Unlike many of the non -naturally occurring toxins, those that exist only as a result of chemical synthesis, the toxins of biological origin all exist m some ecological niche. In addition, these tomes are bioorganic molecules. Some are proteins or peptides; others are small alkaloid -like molecules. All are susceptible to degradation, denaturation or decay, whether within an organism or upon exposure to heat, acids, bases, enzymes or, in some cases, simple dilution. I laboratory work with toxins may pose risks to an individual who becomes exposed accidentally to toxic material, but unlike organisms, tomes are not living entities and do not propagate themselves in a host or in the environment. Thus, unlike disease-causing organisms, toxins cannot be transmitted from person -to-person (or animal or insect) (see Appendix 9).

3.2 Types of Studies Conducted Using Toxins

Various tones are used throughout research, development, and testing activities. Studies conducted include basic research to elucidate the mechanism of action of a particular toxin, preparation of antibodies to a toxin, structural analyses to identify the parts of a toxin responsible for immunity, production of toxoids (inactivated toxins which are not toxic but can elicit an immune response) in support of vaccine development efforts, testing of decontaminants to determine efficacy against toxins, development and testing of methodologies with cellular receptors or antibodies for detection and identification of toxins, and testing of personal protective devices for effectiveness when exposed to toxins.

Representative toxins used in the BDRP include the following: botulinum toxin, anthrax toxin, staphylococcal enterotoxins, plant toxins such as ricin, toxins derived from snake and arachnid venoms, toxins produced by blue-green algae and other marine and fresh water organisms, tetrodotoxin, and trichothecene mycotoxins. Physiologically active compounds, particularly peptide hormones and neuromodulators, are included for consideration in the toxin category because excesses of these compounds can cause physiological unbalances similar to those caused by some tomes.

33 Rationale for the Use of Toxins in the BDRP

Toxins have traditionally been identified as significant biologic threat agents (9) and thus are the focus of BDRP efforts to develop defensive measures such as vaccines, drugs, and protective material.

3.4 Environmental, Health and Safety Considerations

Because toxins are non-living and cannot establish themselves in the natural environment, they pose very little threat to the environment outside of the laboratory. BDRP laboratory workers who handle anthrax or botulinum toxins (or the organisms that produce them) in quantities larger than those which would be encountered in a typical clinical or diagnostic laboratory are immunized with the appropriate toxoid (botulinum) or vaccine (anthrax). Although there are no nationally recommended biosafety levels for work with toxins per se, the CDC-NIH guidelines (1) recommend biosafety level 2 for work conducted with Clostridium botulinum, the bacterium that produces the potent botulinum neurotoxin. In addition, appendix F of the NIH Guidelines for Research involving Recombinant DNA Molecules (6) addresses the appropriate levels of biosafety for use in cloning toxic molecule genes. For the most potent classes of toxins, biosafety levels 2 or 3 are recommended, depending upon the biological containment (host -vector) system used (see Appendix 10). Unless there are procedures that would pose an increased risk to the laboratory worker, such as potential creation of aerosols or work with highly concentrated materials, work with toxins is appropriately conducted in biosafety level 2 laboratories.

3.5 Waste Materials

All laboratory materials containing or exposed to toxins are decontaminated, either chemically or with high heat, prior to disposal.

3.6 Security

Stock quantities of toxins are maintained in locked freezers or refrigerators. For those toxins that are studied within BL-3 laboratories, additional security is provided by the overall security provisions and access restrictions for such areas (see Appendix 12). Most of the toxins studied in the BDRP are available from commercial chemical/biochemical companies that sell research, diagnostic, and clinical reagents to biomedical laboratories. The quantities of any given toxin that are marketed and shipped are marked with appropriate warnings regarding potential biohazards, and are sold only to institutions which appropriately identify themselves as legitimate biomedical organizations.

3.7 Accidents and Incidents

The handling of toxins known to cause disorders in humans always poses a potential risk to laboratory personnel. These risks are minimized by the use of special biosafety facilities, equipment and procedures for those activities that would otherwise cause a high potential for exposure. In laboratories performing basic research studies with toxins, only minute quantities of a particular toxin are in use at any given time, and these small quantities pose virtually no risk to the laboratory workers. While some of the toxins studied, for example, botulinum toxin or tetrodotoxin are sometimes lethal to man even with medical treatment, most of the toxicoses caused by other toxins can be treated successfully with supportive care and/or drugs which antagonize the action of the particular toxin.

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There has been no occurrence in any laboratory worker associated with the BDRP of intoxication or poisoning as a result of handling toxins of biological origin.

3.8 Program Benefits

The development of vaccines and therapeutic drugs for potential biological warfare threat toxins enhances the national defense posture with respect to these threats. The basic research conducted to understand the mechanism of action of many of these toxins contributes to the general scientific community. Methods of detection developed for tomes of interest in the BDRP have many potential applications in the public health arena, where food borne tomes (such as saxitoxin, enterotoxins, botulinum toxin, mycotoxins) often cause serious economic and medical problems. It is of interest to note that one of the most potent

tomes known to man, botulinum tome, has been used successfully as a specific treatment for a disorder of the eye muscles known as blepharospasm. There are active efforts on the part of the biomedical community to develop methods for "targeting" toxins to cancerous cells and tumors, thus harnessing the potent toxicity of these materials for a positive effect.

4. Low Hazard Organisms

4.1 Introduction

The group of microorganisms designated mow hazard" by the CDC includes a broad spectrum of indigenous microorganisms present in the community and associated with human disease of varying severity (e.g., communicable diseases), as well as organisms present in the environment and not known to cause disease in healthy adult humans (1). By definition, the low hazard organisms pose far less potential risk to the workforce and to the environment than the high hazard organisms. Organisms in this category are incorporated into the program whenever they can be used and still give meaningful results. Organisms used as simulants in testing of physical protective devices belong to that class not known to cause disease in healthy adult humans. In addition, the live, attenuated vaccine strains of venous hazardous viruses or bacteria are classified as low hazard organisms.

4.2 Types of Studies Conducted with Low Hazard Organisms

Basic research studies of disease pathogenesis using both in vitro and animal models are conducted with many of the low hazard organisms. Laboratory development and testing of personal protective material, detector methodologies, and rapid identification and diagnosis methodologies are most often conducted with the low hazard organisms. Clinical **trials of** live, attenuated vaccines or of the efficacy of an antiviral drug involve the use of low hazard organisms with human volunteers. Such clinical trials are conducted only after a thorough scientific and human use committee review and approval, and only under conditions of informed consent.

Representative low hazard organisms used in the BDRP are: Punta Toro virus, Pichinde virus, Dengue viruses, the live vaccine strains of yellow fever and Venezuelan equine encephalomyelitis viruses (17D and TC83, respectively), Sandfly fever virus, the live vaccine strain of Francisella tularensis, and attenuated strains of Bacillus anthracis.

4.3 Rationale for the Use of Low Hazard Organisms in the BDRP

Low hazard organisms are used in BDRP research, development, and testing when the results obtained with such organisms will adequately address the questions posed. Development of experimental and test methodologies is often performed with the low hazard organisms prior to testing with higher hazard organisms. The low hazard organisms require less rigorous containment facilities, equipment, and procedures than the high hazard organisms. Thus, their use allows for reservation of BL-3 or BL-4 facilities and equipment for appropriate uses. The low hazard organisms also, by definition, pose less risk to the workforce and environment, and thus are more safely handled by laboratory staff.

4.4 Environmental, Health and Safety Considerations

The low-hazard organisms are appropriately studied in BL -1 or BL-2 facilities. The recommendations that these organisms and/or strains can be studied safely at Biosafety Levels 1 or 2 are based on adequate historical laboratory experience which indicates that a) no overt laboratory-associated infections have been reported, or b) infections resulted from exposures other than to infectious aerosols, or c) if aerosol exposures are documented, they represent an uncommon route of exposure. It must be reiterated that many organisms that can be handled safely at BL-2 in small quantities by routine procedures still are classified as requiring BL-3 facilities, equipment, and procedures for studies that involve handling of larger quantities of organisms or which potentially generate aerosols. In addition, it is recommended that laboratory workers be immunized with the live, attenuated vaccine strains such as TC-83 (VEE), 17D (yellow fever) or LVS (tularemia) when they are handling these organisms in BL-2 laboratories.

4.5 Waste Materials

Biological wastes of low hazard organisms are routinely killed, inactivated, or decontaminated either by autoclaving (high temperature sterilization) or by chemical decontamination (bleach or Lysol solutions).

4.6 Security

The access restrictions for BL-1 and BL-2 laboratories are described in Appendix 12. Because the low hazard infectious organisms present only minimal risk to laboratory workers or to the environment, extraordinary security precautions are not warranted.

4.7 Accidents and Incidents

Handling of organisms capable of causing infections in humans always poses a potential risk to laboratory personnel. Thus, biosafety facilities, procedures, and equipment, and vaccines, have been developed to minimize these risks. Since 1971, there have been no occurrences of overt disease in laboratory workers handling infectious organisms within BL-1 and BL-2 BDRP laboratory facilities. There have been laboratory accidents which resulted in potential exposures; however, prior immunization or immediate treatment with the appropriate therapy have averted the possible development of clinical disease (see Appendix 8). There have never been any occurrences of infections in non-laboratory

workers or in the general community arising from organisms handled in BL -1 or BL-2 facilities associated with the BDRP.

4.8 Program Benefits

The development of detector methodologies, rapid identification and diagnosis methodologies, and personal protective materiel for potential biological warfare threat agents enhances the national defense posture with respect to these threats. The results of the BDRP efforts with low hazard organisms contribute to a better understanding of the pathogenesis of many exotic diseases on the part of the general scientific community, and to the development of defensive methodologies and materiel.

5. Rapid Diagnosis and Detection

5.1 Introduction

The development of rapid diagnosis and detection methodologies and equipment is a major identifiable program area that is of overall low risk potential to human health and the environment. The development and design of detection equipment, development of assay systems, and associated use of non-hazardous and non-toxic biological materials is considered in this category.

5.2 Types of Studies Conducted for Rapid Diagnosis and Detection Efforts

Efforts conducted in support of development of rapid diagnosis procedures and detection equipment include the development of prototypes of assay systems, detection methodologies based on biological materials, and remote sensor detection equipment. In the development of assay systems and detection methodologies, efforts are directed toward the development of reagents, including antibodies, antigens, nucleic acid probes, or receptors attached to inert substrates, and toward the development of sensor systems with the capabilities to detect minute amounts of sample. The reagents, methodologies, and procedures are developed with the goal of detecting potential biological threat materials in clinical specimens as well as in field specimens. The development of rapid diagnosis and detection prototype methodologies and equipment only requires the use of non-infectious materials, for example, antigens (proteins) purified from an organism, or other purified biological materials such as receptors, because the methodologies used do not depend on the growth of an organism. During the development phase, toxoids (inactivated and detoxified toxins are used to test methods, procedures, and sensitivity of detection systems. All of the work conducted in support of this program effort is safely conducted in BL-1 or BL-2 facilities.

53 Rationale for BDRP Rapid Diagnosis and Detection Efforts

A good defensive posture against potential biological warfare threats includes the development of methods to detect such threats in a field setting, as well as the development of diagnostic systems that could be used to determine, in a timely manner, whether such an attack has occurred. In the case of biological threats that could cause severe disease or

toxicosis, the ability to detect or diagnose the threat agent in a timely manner could potentially be a significant consideration to the personnel at risk.

5.4 Environmental, Health and Safety Considerations

Because the development efforts described here do not involve the use of either toxic or infectious materials per se, laboratory workers involved in the rapid diagnosis and detection programs are exposed to little risk beyond that associated with the ordinary commercial or industrial workforce. There are no significant or minor environmental or safety considerations associated with these development efforts.

5.5 Waste Materials

The non-infectious, non-toxic waste materials generated in laboratories involved in rapid diagnosis and detection are disposed of in accordance with routine, accepted procedures for the disposal of general laboratory wastes. Any potentially infectious or toxic materials would be disposed of only after proper sterilization or decontamination as described for low or high hazard organisms, or toxins in the preceding sections.

5.6 Security

The access restrictions for BL-1 and BL-2 laboratories are described in Appends 12. Because the reagents and materials used in the development of rapid diagnosis and detection procedures and systems present only minimal risk to laboratory workers or to the environment, extraordinary security precautions are not warranted.

5.7 Accidents and Incidents

There have been no accidents or incidents among laboratory workers, their close associates, or the general community from the biological materials used specifically in the development of rapid diagnosis and detection systems.

5.8 Program Benefits

The development of rapid identification and diagnosis methodologies, and remote and laboratory detection equipment for potential biological warfare threat agents enhances the national defense posture with respect to these threats. The results of the BDRP efforts in rapid diagnosis are of benefit to the general population, as these efforts have resulted in the development of sensitive assays for the identification of various exotic, endemic diseases in clinical specimens. Scientists associated with this portion of the BDRP have, on numerous occasions, shared their expertise, methodologies, and reagents with health scientists in other countries where outbreaks of diseases such as Rift Valley fever have occurred. BDRP scientists provided diagnostic reagents and expertise to assist in the diagnosis and management of a recent outbreak, in U.S. troops stationed in the far East, of hemorrhagic fever with renal syndrome.

6. Vaccine and Drug Therapy Development

6.1 Introduction

This subject area is a major identifiable element of the BDRP in which the potential risks or impacts are of a markedly different nature than those evaluated under the other categories. This subject area includes only the preclinical and clinical testing of potential therapeutic compounds, i.e. antiviral drugs or anti-toxin drugs, immunomodulators, antibodies and vaccines. The other aspects of drug and vaccine development involving use of infectious organisms or toxins are covered under one or more of the other subject area risk/issue categories.

6.2 Types of Studies Conducted in Vaccine and Drug Therapy Development

Preclinical drug or vaccine testing, as the term "preclinical" implies, involves testing only in or with in vitro laboratory experimental systems. Any "challenge studies", where the efficacy of a drug or vaccine is tested against the disease or toxin of interest, are considered for the purposes of the IAM analysis under the appropriate risk/issue category, i.e. high hazard organisms, low hazard organisms, or toxins Phase I clinical teals involve small numbers of human medical research volunteers; the object of a phase I clinical trial being to establish the safety of the drug or vaccine of interest and the appropriate dose ranges. Phase II clinical trials are conducted with relatively small numbers of human volunteer subjects (on the order of tens of individuals) to obtain initial estimates of efficacy by measuring immunogenicity. Phase III clinical trials are conducted in larger numbers of volunteers (on the order of hundreds to thousands) in order to establish statistically significant efficacy data This phase of testing is not performed at the BDRP primary sites.

Phase III clinical testing of drugs or vaccines is only conducted where and when a target disease occurs naturally. Such human testing is conducted under appropriate controlled conditions meeting the human testing standards of the United States and of the country in which a study may be conducted. There is no introduction of an organism into the environment, and no additional risk to human or environmental health and safety over that which is a result of the occurrence of natural, endemic disease.

Representative vaccines in various stages of development in the BDRP include: the live, attenuated Chikungunya and Junin viral vaccines, an improved anthrax vaccine, an improved Q fever vaccine, and an improved Rift Valley fever vaccine. Efforts to improve the efficacy of existing vaccines or toxoids include developmental studies of microencapsulated vaccine and other immunogen delivery systems. The development effort for drugs effective against viral diseases has advanced to the point where one antiviral drug is in phase II clinical trials. The development effort for drugs effective against the various toxins of interest is still in its infancy, with the effort focused on basic and exploratory research.

6.3 Rationale for BDRP Vaccine and Drug Therapy Development

The goal of the drug development efforts conducted in the BDRP is to identify and develop, for human use, broad-spectrum therapeutic and prophylactic drugs and immunomodulators that would be effective against viruses and tomes. The pharmaceutical industry has, over the years, developed numerous antibiotics, and many of these are effective in treatment of the bacterial and rickettsial diseases studied in the BDRP. The development of antiviral and anti-toxin drugs is in its infancy in comparison to the status of antibiotic development. In addition, the pharmaceutical industry does not place a high priority on development of drugs for treatment of diseases that do not have a significant incidence of occurrence in the United States or other western countries. Thus, the drug discovery effort for the diseased and toxins of interest in the BDRP, which are primarily naturally occurring diseases found in other parts of the world, is undertaken within the BDRP.

Similar considerations pertain to vaccine development. The U.S. pharmaceutical industry is primarily interested in the development of vaccines for communicable diseases prevalent in the United States. The biomedical communities of many of the countries where the viral diseases of interest are endemic are in no position to undertake vaccine development efforts. Because the goal of the BDRP is to provide protection against potential biological warfare threats as well as against endemic diseases to which troops may be exposed, efforts to develop effective vaccines for selected viral diseases are an important part of the program.

6.4 Environmental, Health and Safety

There is always a finite element of risk involved in testing experimental drugs or vaccines in human volunteers. For this reason, such testing is closely regulated by the NIH, the Food and Drug Administration, and within the DoD. There is no known significant risk to the environment arising from RDT&E activities conducted in support of vaccine and drug therapy development.

6.5 Waste Materials

The only waste materials that could be of concern in vaccine and drug development, other than materials covered in other risk/issue categories such as high and low hazard organisms, would be live, attentuated organism vaccines. Such materials are killed by autoclaving or by chemical inactivation before disposal. Syringes, needles, and other medical supplies that have had direct contact either with bodily fluids or biological materials are disposed of in accordance with standard procedures, i.e. in puncture -proof receptacles, closed waste containers, and autoclaved before disposal.

6.6 Security

Any drugs or vaccines used in studies designed to support an application to the FDA for exemption as an investigational new drug (IND) (or biologic product) are closely controlled, monitored, and accounted for. Access to these materials is limited solely to

authorized investigators, and all use of the test materials must be documented thoroughly. An additional security consideration unrelated to environmental issues is that patient medical records and medical records from clinical trials are subject to the provisions of the Privacy Act.

6.7 Accidents and Incidents

There have been no accidents or incidents among laboratory workers, their close associates, or the general community from the biological materials used specifically in vaccine and drug therapy development.

6.8 Program Benefits

The availability of useful drug therapies for treatment of diseases or toxicoses that could be caused by potential biological warfare threat agents would be a great benefit to the national defense posture, The public benefits of this effort are the potential discovery and/or development of vaccines and treatments for diseases and toxicoses that are significant public health problems in many less developed parts of the world.

7. Other Program Research and Development Activities

7.2 Introduction

This category includes those subject areas of the BDRP that do not appropriately fit into one or more of the categories defined previously, that are likely to have imperceptible, -if any, program-unique impact on the human or natural environment, and were not discrete subject areas warranting separate consideration.

7.2 Types of Studies Conducted

Examples of the sorts of activities included in this category are literature studies, purification of antibodies from immune plasma or hybridoma cells, growth of cultured animal or insect cells for use in experimental studies, manipulation of mouse spleens and cultured non -human cell lines for the creation of hybridoma cell lines that secrete monoclonal antibodies, purification of proteins or enzymes after isolation from cultures of various organisms, and light and electron microscopy (Microscopy samples are chemically inactivated and embedded in wax or plastic resins). Also included in this category are activities involving the chemical synthesis of potential therapeutic compounds in support of the Vaccine and Drug Therapy Development program area These efforts are conducted in organic or medicinal chemistry laboratories, and are not considered to be significant or program-unique in that the BDRP-related fraction of this effort on a national scale is infinitesimally small. In addition, the BDRP—supported chemical synthesis efforts are no different in nature from those supported by the pharmaceutical industry, and are many orders of magnitude smaller.

7.3 Rationale for other BDRP Research and Development Activities

Most, if not all, of the activities identified above can be viewed as "support" efforts for the other program areas of the BDRP. As such, they are integral components of the program but do not play a discrete role in defining the BDRP.

7.4 Environmental, Health and Safety Considerations

With the exception of specific considerations for certain laboratory chemicals and reagents employed in these "other activities, there are no BDRP-specific environmental, health or safety considerations that differ in any way from the general considerations for these areas that apply in the public, commercial arena Certain chemicals used in biomedical studies are classified as explosive, oxidants, flammable, toxic, irritant, corrosive, or biohazardous. The quantities of such materials used within the BDRP are extremely small, on the order of milligrams or grams, or liters, per year. These quantities are on the order of millions of times smaller than those employed in the chemical and pharmaceutical industries, and therefore represent a proportionally minuscule hazard. None of the chemicals used within the BDRP is classified as Surety Materials and therefore do not require coverage by DA chemical surety regulations.

7.5 Waste Materials

Laboratory materials that are non-toxic, uninfectious, and not biohazardous are appropriately disposed of in the ordinary waste stream. Chemicals or substances subject to coverage in the Resource Conservation and Recovery Act (RCRA) regulations (40 C.F.R. 2615(g) et seq.) are collected, identified, manifested, and disposed of by private contractors specifically licensed under applicable state programs to perform such disposal.

7.6 Security

The facility security provisions employed for the protection of real and personal property provide the appropriate level of security for the materials and activities identified in this program category. Specific storage requirements for volatile or explosive chemicals are mandated by OSHA and NFPA regulations and implemented through institutional safety offices.

7.7 Accidents and Incidents

By and large, the accidents or incidents related to this category of activities are the same sorts as one would encounter in everyday life, for example, getting a cut from broken glass. As described above, the quantities of potentially hazardous chemicals used within the BDRP are so small that only extremely localized effects could arise from any accident or incident. The only possible hazard would be to the laboratory worker.

7.8 Program Benefits

In that the activities described here support other BDRP functions, they contribute to the overall benefits of the BDRP in the areas of national defense posture, contributions to the scientific community, and to public health.

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APPENDIX C GENERAL CHARACTERISTICS OF BSL-2 AND BSL-3 LABORATORIES

Laboratory Biosafety Level Criteria - Biosafety Level-2¹

A. Standard Microbiological Practices

- 1. Access to the laboratory is limited or restricted by the laboratory director when work with infectious agents is in progress.
- 2. Work surfaces are decontaminated at least once a day and after any spill of viable material.
- 3. All infectious liquid or solid wastes are decontaminated before disposal.
- 4. Mechanical pipetting devices are used; mouth pipetting is prohibited.
- 5. Eating, drinking, smoking, and applying cosmetics are not permitted in the work area Food may be stored in cabinets or refrigerators designated and used for this purpose only. Food storage cabinets or refrigerators should be located outside of the work area
- 6. Persons wash their hands after handling infectious materials and animals and when they leave the laboratory.
- 7. All procedures are performed carefully to minimize the creation of aerosols.

B. Special Practices

- 1. Contaminated materials that are to be decontaminated at a site away from the laboratory are placed in a durable leakproof container which is closed before being removed from the laboratory.
- 2. The laboratory director limits access to the laboratory. In general, persons who are at increased risk of acquiring infection or for whom infections may be unusually hazardous are not allowed in the laboratory or animal rooms. The director has the final responsibility for assessing each circumstance and determining who may enter or work in the laboratory.

¹From CDC/NIH, 1988

- 3. The laboratory director establishes policies and procedures whereby only persons who have been advised of the potential hazard and meet any specific entry requirements (e.g. immunization) the laboratory or animal rooms.
- 4. When the infectious agent(s) in use in the laboratory require special provisions for entry (e.g., vaccination), a hazard warning sign, incorporating the universal biohazard symbol, is posted on the access door to the laboratory work area The hazard warning sign identifies the infectious agent, lists the name and telephone number of the laboratory director or other responsible person(s), and indicates the special requirement for entering the laboratory.
- 5. An insect and rodent control program is in effect.
- 6. Laboratory coats, gowns, smocks, or uniforms are worn while in the laboratory. Before leaving the laboratory for nonlaboratory area (e.g.-, cafeteria, library, administrative offices), this protective clothing is removed and left in the laboratory or covered with a clean coat not used in the laboratory.
- 7. Animals not involved in the work being performed are not permitted in the laboratory.
- 8. Special care is taken to avoid skin contamination with infectious materials; gloves should be worn when handling infected animals and when skin contact with infectious material is unavoidable.
- 9. All wastes from laboratories and animal rooms are appropriately decontaminated before disposal.
- 10. Hypodermic needles and syringes are used only for parenteral injection and aspiration of fluid from laboratory animals and diaphragm bottles. Only needle -locking syringes or deposable syringe -needle units (i.e., needle is integral to the syringe) are used for the injection or aspiration of infectious fluids. Extreme caution should be used when handling needles and syringes to avoid autoinoculation and the generation of aerosols during use and disposal. Needles should not be bent, sheared, replaced in the sheath or guard or removed from the syringe following use. The needle and syringe should be promptly placed in a puncture-resistant container and decontaminated, preferably by autoclaving before discard or reuse.

- 11. Spills and accidents which result in overt exposures to infectious material are immediately reported to the laboratory director. Medical evaluation, surveillance, and treatment are provided as appropriate and written records are maintained.
- 12. When appropriate, considering the agent(s) handled, baseline serum samples for laboratory and other at-risk personnel are collected and stored. Additional serum specimens may be collected periodically, depending on the agents handled or the function of the facility.
- 13. A biosafety manual is prepared or adopted. Personnel are advised of special hazards and are required to read instructions on practices and procedures and to follow them.

C. Containment Equipment

Biological safety cabinets (Class I or II) (see Appendix A) or other appropriate personal protective or physical containment devices are used whenever:

- 1. Procedures with a high potential for creating infectious aerosols are conducted. These may include centrifuging, grinding, blending, vigorous shaking or mixing, sonic disruption, opening containers of infectious materials whose internal pressures may be different from ambient pressures, inoculating animals intranasally, and harvesting infected tissues from animals or eggs.
- 2. High concentrations or large volumes of infectious agents are used. Such material may be centrifuged in the open laboratory if sealed heads or centrifuge safety cups are used and if they are opened only in a biological safety cabinet.

D. Laboratory Facilities

- 1. The laboratory is designed so that it can be easily cleaned.
- 2. Bench tops are impervious to water and resistant to acids, alkalis, organic solvents, and moderate heat.
- 3. Laboratory furniture is sturdy, and spaces between benches, cabinets, and equipment are accessible for cleaning.
- 4. Each laboratory contains a sink for handwashing.

- 5. If the laboratory has windows that open, they are fitted with fly screens.
- 6. An autoclave for decontaminating infectious laboratory wastes is available

Laboratory Biosafety Level Criteria - Biosafety Level-3

A. Standard Microbiological Practices

- 1. Work surfaces are decontaminated at least once a day and after any spill of viable material.
- 2. All infectious liquid or solid wastes are decontaminated before disposal.
- 3. Mechanical pipetting devices are used; mouth pipetting is prohibited.
- 4. Eating, drinking, smoking, storing food and applying cosmetics are not permitted in the work area
- 5. Persons wash their hands after handling infectious materials and animals when they leave the laboratory.
- 6. All procedures are performed carefully to minimize the creation of aerosols.

B. Special Practices

- 1. Laboratory doors are kept closed when experiments are in progress.
- 2. Contaminated materials that are to be decontaminated at a site away from the laboratory are placed in a durable leak proof container which is closed before being removed from the laboratory.
- 3. The laboratory director controls access to the laboratory and restricts access to persons whose presence is required for program or support services. Persons who are at increased risk of acquiring infection or for whom infection may be unusually hazardous are not allowed in the laboratory or animal rooms. The director has final responsibility for assessing each circumstance and determining who may enter or work in the laboratory.

- 4. The laboratory director establishes policies and procedures whereby only persons who have been advised of the potential biohazard, who meet any specific entry requirements (e.g. immunization), and who comply with all entry and exit procedures enter the laboratory of animal rooms.
- 5. When infectious materials or infected animals are present in the laboratory or containment module, a hazard warning sign, incorporating the universal biohazard symbol, is posted on all laboratory and animal room access doors. The hazard warning sign identifies any special requirements for entering the laboratory, such as the need for immunizations, respirators, or other personal protective measures.
- 6. All activities involving infectious materials are conducted in biological safety cabinets or other physical containment devices within the containment module. No work in open vessels is conducted on the open bench.
- 7. The work surfaces of biological safety cabinets and other containment equipment are decontaminated when work with infectious materials is finished. Plastic -baked paper toweling used on nonperforated work surfaces within biological safety cabinets facilitates clean -up.
- 8. An insect and rodent control program is in effect.
- 9. Laboratory clothing that protects street clothing (e.g. solid front or wrap-around gowns, scrub suits, coveralls) is worn in the laboratory. Laboratory clothing is not worn outside the laboratory, and it is decontaminated before being laundered.
- 10. Special care is taken to avoid skin contamination with infectious materials; gloves should be worn when handling infected animals and when skin contact with infectious materials is unavoidable.
- 11. Molded surgical masks or respirators are worn in rooms containing infected animals.
- 12. Animals and plants not related to the work being conducted are not permitted in the laboratory.
- 13. All wastes from laboratories and animal rooms are appropriately decontaminated before disposal.

- 14. Vacuum lines are protected with high efficiency air (HEPA) filters and liquid disinfectant traps.
- 15. Hypodermic needles and syringes are used only for parenteral injection and aspiration of fluids from laboratory anneals and diaphragm bottles. Only needle -locking syringes or disposable syringe -needle units (i.e., needle is integral to the syringe) are used for the injection or aspiration of infectious fluids. Extreme caution should be used when handling needles and syringes to avoid autoinoculation and the generation of aerosols during use and disposal. Needles should not be bent, sheared, replaced in the sheath or guard or removed from the syringe following use. The needle and syringe should be promptly placed in a puncture-resistant container and decontaminated, preferably by autoclaving, before discard or reuse.
- 16. Spills and accidents which result in overt or potential exposures to infectious materials are immediately reported to the laboratory director. Appropriate medical evaluation, surveillance, and treatment are provided and written records are maintained.
- 17. Baseline serum samples for all laboratory and other at -risk personnel should be collected periodically, depending on the agents handled or the function of the laboratory.
- 18. A biosafety manual is prepared or adopted. Personnel are advised of special hazards and are required to read instructions on practices and procedures and procedures to follow them.

C. Containment Equipment

Biological safety cabinets or other appropriate combinations of personal protective or physical containment devices (e.g. special protective clothing, masks, gloves, respirators, centrifuge safety caps, sealed centrifuge rotors, and containment caging for animals) are used for all activities with infectious materials which pose a threat of aerosol exposure. These include: manipulation of cultures and of those clinical or environmental materials which may be a source of infectious aerosols; the aerosol challenge of experimental animals; harvesting of tissues or fluids from infected animals and embryonated eggs, and necropsy of infected animals.

D. Laboratory Facilities

- 1. The laboratory is separated from areas which are open to unrestricted traffic flow within the building. Passage through two sets of doors is the basic requirement for entry into the laboratory from access corridors or other contiguous areas. Physical separation of the high containment laboratory from access corridors or other laboratories or activities may also be provided by a double-doored clothes change room (showers may be included), airlock, or other access facility which requires passage through two sets of doors before entering the laboratory.
- 2. The interior surfaces of walls, floors, and ceilings are water resistant so that they can be easily cleaned. Penetrations in these surfaces are sealed or capable of being sealed to facilitate decontaminating the area
- 3. Bench tops are impervious to water and resistant to acids, alkalis, organic solvents, and moderate heat.
- 4. Laboratory furniture is sturdy and spaces between benches, cabinets, and equipment are accessible for cleaning.
- 5. Each laboratory contains a sink for handwashing. The sink is foot, elbow, or automatically operated and is located near the laboratory exit door.
- 6. Windows in the laboratory are closed and sealed.
- 7. Access doors to the laboratory or containment module are self
- 8. An autoclave for decontaminating laboratory wastes is available, preferably within the laboratory.
- 9. A ducted exhaust air ventilation system is provided. This system creates directional air -flow that draws air into the laboratory through the entry areas. The exhaust air is not recirculated to any other area of the building, is discharged to the outside, and is dispersed away from occupied areas and air intakes. Personnel must verify that the direction of the airflow (into the laboratory) is proper. The exhaust air from the laboratory room can be discharged to the outside without being filtered or otherwise treated.

10. The HEPA-filtered exhaust air from Class I or Class II biological safety cabinets is discharged directly to the outside or through the building exhaust system. Exhaust air from Class I or II biological safety cabinets maybe recirculated within the laboratory if the cabinet is tested and certified at least every twelve months. the HEPA-exhaust air from Class I or II biological safety cabinets is to be discharged to the outside through the building exhaust air system, it is connected to this system in a manner (e.g., thimble unit connection) that avoids any interference with the air balance of the cabinets or building exhaust system.

APPENDIX D DOCUMENTATION FOR THE WRAIR SPECIAL MEDICAL WASTE INCINERATOR



DEPARTMENT OF THE ARMY WALTER REED ARMY INSTITUTE OF RESEARCH WALTER REED ARMY MEDICAL CENTER WASHINGTON, D.G. 2007-5100

October 10, 1989

IN REPLY REFER TO:

Office of the Director

SUBJECT: Air Toxic Regulation

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AIR MANAGEMENT. ADMINISTRATION

Laramie Daniel
Enforcement Program
Air Management Administration
2500 Broening Highway
Baltimore, MD 21224

Dear Sir:

Enclosed are the list of the Toxic Air Pollutants discharged by our incinerator (Permit No. 15-0983-2-0126) and a calculation for each pollutant's maximum hourly and maximum annual emissions.

If you need further information, please contact the undersigned at (301) 427-5193.

Encl

Charles P. Raflo Colonel, US Army

Director

Division of Veterinary Medicine

CF: Mrs. Moyer



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AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224

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AIR MANAGEMENT.
ADMINISTRATION

REPORTING FORM FOR THE JANUARY 1, 1989 REPORTING REQUIREMENT OF MARYLAND'S AIR TOXIC REGULATION (COMAR 26.11.15)

GENERAL: There are two parts to this form. Part A is simply a qualitative listing of all Toxic Air Pollutants (TAPs) discharged by your premise that are covered by the regulations. Part B is used to provide more detailed information on each TAP listed in part A. If ten TAPs are listed in Part A, then ten Part B forms must be filled out.

PART A: LIST OF TOXIC AIR POLLUTANTS DISCHARGED

	Chemical Name	Chemical Abstract Services (CAS) Number (1)
1	HYDROREN CHLORIDE	7647-01-0
2	- ARSOUL	7440-38-2
3	CADMIUM	7440 - 43-9
4 .	CHROMIUM	7+40-47-3
5	IRON	1309-37-1
6	MANGANESE	7439-965
7	NICKEL	7440-02-0
8	DIOXINS & FURAUS	
. 9	•	
10		
11		
12		
13		•
14		
15		
16		
(1)	CAS Numbers are listed in the	2 regulations.



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AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224

PART B: ESTIMATED ALLOWABLE EMISSIONS (2) FOR EACH TOXIC AIR POLLUTANT DISCHARGED

Chemical Name: HTOROGEN CHLORIDE CAS. NO. 7647-01-0

ESTIMATED ALLOWABLE EMISSIONS FOR THE ENTIRE PREMISE:
All emissions, including point source emissions and fugitive emissions, must be included. Emission estimates must be in sufficient detail to perform a "Screening Analysis" as defined in COMAR 26.11.15.07. More detailed emission estimates may be required at some later date.

MAXIMUM HOURLY:		4.4625	LBS/HR
		3.0	
MUMIXAM	ANNUAL:	39091.5	LBS/YEA

BASIS OF EMISSION ESTIMATE: Briefly explain how the emission estimate was calculated (e.g. mass balance calculations, stack testing, worst-case assumption, etc.). Attach additional calculation sheets if necessary.

ANNUAL: 24HRS x 350 LBS x 365 DAYS = 3066000 LBS : 17M = 7R = 7R = 2000-BS

HOURLY: 350 LBS x 25.5 LBS x 1700 = [4.4625 LB/HR]

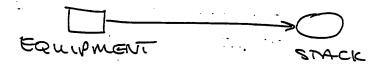
BURN: 1000 LB3 & 1 TON × 25.5 LB5 = 12.75 LB3/LOAD

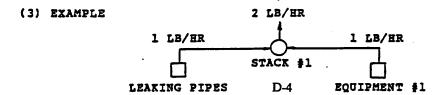
BURN IS 1000 LB DIVIDED OUTER 3 LOADS

(2) Allowable emissions means the maximum emissions a source or installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement, or court order.

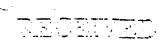
D-3

EMISSION FLOW DIAGRAM: Sketch the flow of emissions from equipment (or other areas where emissions are generated) to stacks (or other areas where emissions are discharged). Use O for stacks (release points) and [] for equipment (where emissions are generated). Label all stacks and equipment. (3)









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AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224

AND AND GENERATION

PART B: ESTIMATED ALLOWABLE EMISSIONS (2) FO TOXIC AIR POLLUTANT DISCHARGED	R EACE
Chemical Name: ARSENIC	cas. $no. 7440 - 38 - 2$
ESTIMATED ALLOWABLE EMISSIONS FOR THE ENTIRE All emissions, including point source emissiomissions, must be included. Emission estim sufficient detail to perform a "Screening An in COMAR 26.11.15.07. More detailed emission required at some later date.	ons and fugitive ates must be in alysis" as defined
MAXIMUM HOURLY: 3.74×10 ⁻⁵ LBS/HR	
MAXIMUM ANNUAL: 3280.62×10 ⁻⁴ LBS/YEAR	· ·
BASIS OF EMISSION ESTIMATE: Briefly explain estimate was calculated (e.g. mass balance of stack testing, worst-case assumption, etc.). additional calculation sheets if necessary.	alculations,

OURLY: 350 LBS x 2.14 × 10-4 LBS x 1700 LBS = 3.74 × 10-5 LB/HZ

BURN: 1000 LBS * 1700 × 2.14×10-4 LBS = [1.07×10-4 LBS/LOAD]

IN CINERATUR RATED AT 350 LB/HR NORMAL

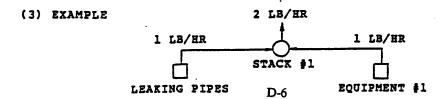
BURN IS LOOD LB DIVIDED OVER 3 LOADS

(2) Allowable emissions means the maximum emissions a source or installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement, or court order.

D-5

EMISSION FLOW DIAGRAM: Sketch the flow of emissions from equipment (or other areas where emissions are generated) to stacks (or other areas where emissions are discharged). Use O for stacks (release points) and [] for equipment (where emissions are generated). Label all stacks and equipment. (3)







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AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224

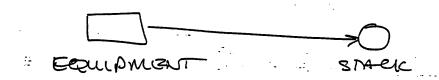
_	PART B: ESTIMATED ALLOWABLE EMISSIONS (2) FOR EACH TOXIC AIR POLLUTANT DISCHARGED
	Chemical Name: CADMIUM CAS. NO.7440-43-9
.	ESTIMATED ALLOWABLE EMISSIONS FOR THE ENTIRE PREMISE: All emissions, including point source emissions and fugitive emissions, must be included. Emission estimates must be in sufficient detail to perform a "Screening Analysis" as defined in COMAR 26.11.15.07. More detailed emission estimates may be required at some later date.
_	MAXIMUM HOURLY: 1.19 × 10-3 LBS/HR
	MAXIMUM ANNUAL: 10.42 LBS/YEAR
•	BASIS OF EMISSION ESTIMATE: Briefly explain how the emission estimate was calculated (e.g. mass balance calculations, stack testing, worst-case assumption, etc.). Attach additional calculation sheets if necessary.
UU	141: 24 H23 & 350 LBS , 365 DAYS = 3066000 LBS = 1 TON = 2000 LBS
	4R × 6.8 × 10-3 LAS = [10.42 LB5/7R]
. Ju	RLY: 350 LB x 6.8 × 10 ⁻³ LBS x 1700 = [1.19 NOLES/HR]
	MAC 1000 USS # 1700 X 6.8 × (0-3 LBS = 3.4 × 10-3 CBS / TOPA)
	1200 - 100 -

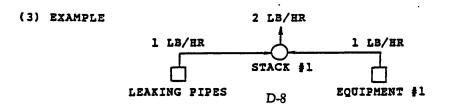
INCINERATOR RATED AT 350 LB/HR. NIMMAL BURN IS 1000LB DIVIDED OVER 3 LUADS

(2) Allowable emissions means the maximum emissions a source or installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement, or court order.

D-7

EMISSION FLOW DIAGRAM: Sketch the flow of emissions from equipment (or other areas where emissions are generated) to stacks (or other areas where emissions are discharged). Use 0 for stacks (release points) and [] for equipment (where emissions are generated). Label all stacks and equipment. (3)







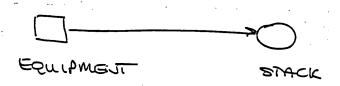
AIR MANAGEMENT ADMINISTRATION

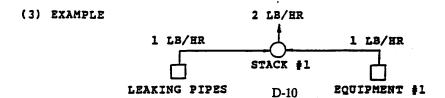
AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224

Chemical Name: CHROWIUM CAS. NO. 7440-47 ESTIMATED ALLOWABLE EMISSIONS FOR THE ENTIRE PREMISE:	-3
ESTIMATED ALLOWABLE EMISSIONS FOR THE ENTIRE PREMISE:	
All emissions, including point source emissions and fugitive emissions, must be included. Emission estimates must be in sufficient detail to perform a "Screening Analysis" as defined in COMAR 26.11.15.07. More detailed emission estimates may be required at some later date.	
MAXIMUM HOURLY: 1.064×10-4 LBS/HR	
MAXIMUM ANNUAL:932 LBS/YEAR	
BASIS OF EMISSION ESTIMATE: Briefly explain how the emission estimate was calculated (e.g. mass balance calculations, stack testing, worst-case assumption, etc.). Attach additional calculation sheets if necessary.	
ANNUAL: 24 HRS x 350 LBS x 365 DAY = 3066000 LBS + 1770 =	
1533 TON x 6.08 x 10-4 LBS = .932 LBS/ER	
HOURLY: 350 LB x 6.08 × 10-4 LBS x 1700 LBS /42	
BURN 1000 LBS X 1 Ton x 6.08 × 10-4 LBS = 3.04 × 10-4 LBS	_OAD
INCINERATOR RATED AT 350 B/HR NORMA BURN IS 1000 ID DIVIDED OVER 3 1000	بد

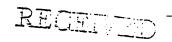
(2) Allowable emissions means the maximum emissions a source or installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement,

EMISSION FLOW DIAGRAM: Sketch the flow of emissions from equipment (or other areas where emissions are generated) to stacks (or other areas where emissions are discharged). Use O for stacks (release points) and [] for equipment (where emissions are generated). Label all stacks and equipment. (3)









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AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224

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	PART B: ESTIMATED ALLOWABLE EMISSION TOXIC AIR POLLUTANT DISCHARGED	NS (2) FOR EACH	٠
	Chemical Name: TRON	cas. no. 13 9-37-1	
~ '	ESTIMATED ALLOWABLE EMISSIONS FOR TRAIL emissions, including point sourcemissions, must be included. Emissisufficient detail to perform a "Screin COMAR 26.11.15.07. More detailed required at some later date.	ce emissions and fugitive ion estimates must be in eening Analysis" as defined	
	MAXIMUM HOURLY: 3.2 ~ 63	_LBS/HR	
÷	MAXIMUM ANNUAL: 28.05	_LBS/YEAR	
	BASIS OF EMISSION ESTIMATE: Briefly estimate was calculated (e.g. mass stack testing, worst-case assumption additional calculation sheets if new	on, etc.). Attach	
A-N N	DAY HR X 365 DAY -	- 3066000 LBS: 17MV = 7000 LB	
•	1233 TM x 1.83×10-585	= 28.05 LRS (YR)	
Hou	HR 1.83 × 10-2 × 1.83 × 10-2 × =	2000 LBS = 3.2 ×10-3 LBS/H2	
NU	BULN: LODO LB × 1.83×10-2 LB *	2000 03 = (-915 × 10-2 LB/WAD)	
i	NCINERATOR RATED AT 3	350th/GR. Normal BURA	J

(2) Allowable emissions means the maximum emissions a source or installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement, or court order.

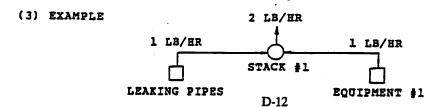
D-11

1000 LB DIVIDED OVER 3 COADS

l S

EMISSION FLOW DIAGRAM: Sketch the flow of emissions from equipment (or other areas where emissions are generated) to stacks (or other areas where emissions are discharged). Use O for stacks (release points) and [] for equipment (where emissions are generated). Label all stacks and equipment. (3)

EQUIPMENT STACK





AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224

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AIR MEDICATE STATE ADMINISTRATION

PART B: ESTIMATED ALLOWABLE EMISSIONS (2) FOR EACH TOXIC AIR POLLUTANT DISCHARGED

Chemical	Name: MANGANESE	CAS.	NO. 7439 - 96-5
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ESTIMATED ALLOWABLE EMISSIONS FOR THE ENTIRE PREMISE:
All emissions, including point source emissions and fugitive emissions, must be included. Emission estimates must be in sufficient detail to perform a "Screening Analysis" as defined in COMAR 26.11.15.07. More detailed emission estimates may be required at some later date.

MAXIMUM HOURLY: 1.995 ×10-4 LBS/HR

MAXIMUM ANNUAL: 1.748 LBS/YEAR

BASIS OF EMISSION ESTIMATE: Briefly explain how the emission estimate was calculated (e.g. mass balance calculations, stack testing, worst-case assumption, etc.). Attach additional calculation sheets if necessary.

ANNUM: 24 HRS x 350 LBS x 365 BAY = 3066000 LBS = 1 TM ZOOULBS

HOUNTY: 350 LB x 1.14×10-3 cBS x 1700 = (1.995 ×10-4 LBS/HZ)

NURMAL 1000 LB x 1.14 × 10-3 c85 x 1700 LBS = 0.57 × 10-3 c3/LOAD

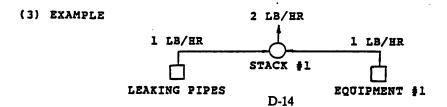
INCINERATOR RATED AT 350 LB/HR. NORMAL BURN IS 1000 LB DIVIDED OVER: 3 LOADS

(2) Allowable emissions means the maximum emissions a source or installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement, or court order.

D-13

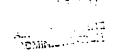
EMISSION FLOW DIAGRAM: Sketch the flow of emissions from equipment (or other areas where emissions are generated) to stacks (or other areas where emissions are discharged). Use 0 for stacks (release points) and [] for equipment (where emissions are generated). Label all stacks and equipment. (3)

Equipment stack





AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224



	PART B: ESTIMATED ALLOWABLE EMISSION TOXIC AIR POLLUTANT DISCHARGED	•
	Chemical Name: NICKEL	cas. no. 7440-02-0
**	ESTIMATED ALLOWABLE EMISSIONS FOR THE ALLOWABLE EMISSIONS FOR THE SOURCE EMISSIONS, must be included. Emissions sufficient detail to perform a "Screen to COMAR 26.11.15.07. More detailed required at some later date.	e emissions and rugitive on estimates must be in the series of the serie
	MAXIMUM HOURLY: 8.7 X (5-4	_LBS/HR
	MAXIMUM ANNUAL: 7.69	_LBS/YEAR
	BASIS OF EMISSION ESTIMATE: Briefly estimate was calculated (e.g. mass back testing, worst-case assumption additional calculation sheets if new	n, etc.). Attach

ANNUAL: 24H2S x 350 LRS x 365 DAY = 3066000 LBS : 1700 = 1533 TON x 5.02 × 10-36 = 7.69 LBS/YR

HOWRLY: 350 LB x 5.02 × 100 LB = [8.7 × LBS / H2]

NORMAL BURN:

1000 LB x 5.02 × 10-3 LBS x 1700 = 2.51 × 10-2 LBS/40AD

INCLUERATION RATED AT 350 UB/HR NOVEMAL LOAD BURN LS 1000 LB DIVIDED OVER 3 LOADS

(2) Allowable emissions means the maximum emissions a source or installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement, or court order.

EMISSION FLOW DIAGRAM: Sketch the flow of emissions from equipment (or other areas where emissions are generated) to stacks (or other areas where emissions are discharged). Use 0 for stacks (release points) and [] for equipment (where emissions are generated). Label all stacks and equipment. (3)

Equipment strew

1 LB/HR 1 LB/HR

STACK #1

LEAKING PIPES D-16

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AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224

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PART B: ESTIMATED ALLOWABLE EMISSIONS (2) FOR EACH TOXIC AIR POLLUTANT DISCHARGED

	TOXIC AIR POLLUTANT DISCHARGED
	Chemical Name: DIOXINS + FURANS CAS. NO
	ESTIMATED ALLOWABLE EMISSIONS FOR THE ENTIRE PREMISE: All emissions, including point source emissions and fugitive emissions, must be included. Emission estimates must be in sufficient detail to perform a "Screening Analysis" as defined in COMAR 26.11.15.07. More detailed emission estimates may be required at some later date.
	MAXIMUM HOURLY: 14.44 ×10-9 LBS/HR
	MAXIMUM ANNUAL: 1.264×10-1 LBS/YEAR
	BASIS OF EMISSION ESTIMATE: Briefly explain how the emission estimate was calculated (e.g. mass balance calculations, stack testing, worst-case assumption, etc.). Attach additional calculation sheets if necessary.
4	NNUM: $\frac{24 \text{ Hz}}{0 \text{ Ay}} \times \frac{350 \text{ LRS}}{\text{He}} \times \frac{365 \text{ DAY}}{\text{YR}} = \frac{3066000 \text{ LB}}{\text{YR}} \div \frac{1750}{2000 \text{ LB}} =$
	15-33 Ton x 8.25 x 10-8 LB = [1.264 x 10-11 LB/22]
1	HOURLY: 350 CB x 8.25 × 10-8 CB x 1700 = [14.44 × 10-9 LB/HR]
	Nuemac
	BULN 1000 LB x 8.25 × 10-8 LB x 175N = [4.125 + 10-8 CB/LGAD]

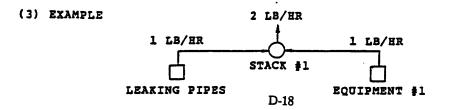
NCINERATOR RATED AT 350 LB/HR. NURMAR BURN 15 1000 # DIVIDED OVER 3 LOADS

(2) Allowable emissions means the maximum emissions a source or installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement, or court order.

D-17

EMISSION FLOW DIAGRAM: Sketch the flow of emissions from equipment (or other areas where emissions are generated) to stacks (or other areas where emissions are discharged). Use O for stacks (release points) and [] for equipment (where emissions are generated). Label all stacks and equipment. (3)

Equipment strew



50BZ1

/SCHERER



DEPARTMENT OF THE ARMY WALTER REED ARMY MEDICAL CENTER WASHINGTON, D.C. 20307-5001



Directorate of Engineering and Housing

JUL 5 1990

Maryland State Dept. of Environment Air Management Division ATTN: Mr. Carl Rivkin 2500 Broening Highway Baltimore, Maryland 21224

AD MARKET BASE

Dear Mr. Rivkin:

Enclosed is the compliance form demonstrating that the Walter Reed Army Institute of Research's (WRAIR) incinerator at Walter Reed Army Medical Center's (WRAMC) Forest Glen Section in Montgomery County, Maryland is in compliance with Maryland's Toxic Air Pollutant (TAP) Regulations, COMAR 26.11.15.

Any questions on the form or the enclosures should be directed to Mr. John G. Miller, (202) 576-0089.

Sincerely,

Enclosures

LLewellyn E. Piper Lieutenant Colonel, U.S. Army Executive Officer

Copies For:

Chief of Staff, WRAMC CH, Environmental Overwatch Comm. Commander, WRAIR



AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY _BALTIMORE, MARYLAND 21224 (301)631-3230

COMPLIANCE FORM FOR THE JULY 1, 1990 AMBIENT IMPACT REQUIREMENT OF MARYLAND'S AIR TOXIC REGULATION (COMAR 26.11.15)

COMPANY NAME: Walter Reed Army Medical Center HSHL-EH						
ADDRESS: 6825 16th St., N.W.						
CITY: Washington, D.C. STATE: ZIP CODE: 20307-5001						
GENERAL: This form <u>MUST</u> be used to demonstrate compliance with the July 1, 1990 ambient impact requirement of Maryland's air toxic regulation. There are 4 parts to this form. Part A must be used to support <u>any</u> emission estimates or dispersion modeling conducted as part of the compliance demonstration. Part B must be used if compliance is being demonstrated using Screening Analysis. Part C must be used for compliance demonstrations involving Second Tier Analysis. Finally, Part D must be used for Special Permits. This for provides a summary of your compliance demonstration. All umentation supporting this form <u>MUST</u> be attached.						
OU MUST CHECK THE APPROPRIATE BOXES BELOW.						
PART A is complete with supporting documentation attached. PART B is complete with supporting documentation attached.						
PART C is complete with supporting documentation attached.						
PART D is complete with supporting documentation attached.						
I hereby certify that, to the best of my knowledge, all of the information in this Compliance Form is correct.						
Responsible Party: Mr. Henry J. Henley, P.E.						
Signature: New York						
Title: Director, Directorate, Engineering & Housing Phone: 576-3434						

PART A: This part must be filled out to support any emission estimates or dispersion modeling conducted as part of the compliance demonstration. Supporting documentation <u>must</u> be attached.

Toxic Air Pollutant Emissions

Estimated Emissions

	Toxic Air Pollutants (list all)	CAS Number	Design Capacity (1b/	Opera	tions (ton/	Compliate (lb/	
L .	Hydrogen Chloride	7647-01-0				0.21	
2		•				. 	
3						· 	
ŀ						· 	
						· 	<u></u>
i ,							
}							
•		•					
LO							
L1			- <u> </u>				
						-	
15							

⁽¹⁾ This column must be filled in with the emission estimates used to demonstrate compliance with the regulations. If continuous emissions at design capacity allow you to demonstrate compliance with all air pollution regulations, then these emissions should be listed here. If the air toxics regulations or any other regulations require you to discharge less than continuously at design capacity, then these emissions should be listed here.

•

tor use of tare torm	T. SEE ALCA COURSE OF THE STATE OF THE SECOND OF THE SECON
SUBJECT:	COMPUTED BY: DATE: FILE NO.
1401 300	TARRISH GALUSKY 27 Feb 90
HCI dispersion	CHECKED BY: DATE: SHEET NO.
Effective Stack	C Height He
- hs/hb = 34/281	1 = 1.2
!'3/hb ~ ~ ~	2, :. He= 34'
Worst - Case hourly	point source impact concentration, Cp
$-C_{\rho}\left(\frac{m_{3}}{m_{3}}\right)=\frac{1.64}{L}$	17 × 105 ()
CP C 1111 /	Her Chri
\ ~ /:	
Where QChr	r) = highest allowable hourly emission rate
an estimat	tion based on a similar model is done.
(See Follow	owing page) -
_	- -
Q(hr) = 0.7	101 15/67
$c_{p} = 1.647$	XIDS Q. 70916/2
	.45t)2
(0 - 101	M / 3

Cp = 101 m/m3

Cp > CsL .'. Emissions are within I limits set

MEMUKANUUM FUK Safety Ufficer, WKAIK

SUBJECT: Incinerator Information

1. Reference your request for further information concerning the incinerator at Bldg 511, Forest Glen, the following is provided:

a) Feed rate: 350 16/hr famally

1230 Sc5m Tambuly personal contact Mr Trayweck (804)550 2842

(-

- b) Stack gas flow rats: not necoured/contact Mr Traywick (804)550 2842
- c) Amount Hydrogen Chloride Emmission: Amount is negligible since it is determined by amount of plastics burned
- d) Design Hydrogen Chloride Emmission Rate: As described above
- c) Stack height: 34 feet above ground, 24 feet above incinerator
- f) Distance to nearest on-site building: Attached/six feet from outer wall Height of building: 28 feet Elevation change between building and incinerator: none
- g) Distance to nearest off-site building: 150 meters
 Height of building: 30 feet
 Elevation change between building and incinerator: none
- h) Hours of Operation of Incinerator: 0730-1500 hrs Days of Operation: Thursday and Friday Weeks of Operation per year: 52 weeks
- 1) Percent of plastics in waste feed: less than 2%
- j) System description: Dual chambered/controlled air
- k) Pollution control device implemented: None, other than the after-burner
- 1) Foint of contact knowledgeable with incinerator design and sparatism:

 Chris Traywick (President), Air Pollution Control Products, (804)550-2842

 Local Point of Contact: SFC Blake Harrison, 427-5195
- m) Operator: Mr Henry L. Fitzgerald

2. Any other questions concerning the incinerator can be referred to SFC Harrison or the undersigned at 427-5193.

CHARLES P. RAFLO

COL, VC

Director, Division of Veterinary Medicine

EMISSION ESTIMATES FOR HC1

As required by the permit application, the HCl emissions from the Walter Reed incinerator located at Forest Glen have been estimated. The estimates are based on a similar incineration system owned and operated by the U.S. Army. The incinerator used for this comparison is located at the Bayne-Jones Community Hospital at Ft Polk, Louisiana. The data used was obtained by the Air Pollution Engineering Division of the United States Army Environmental Hygiene Agency (USAEHA). The document referenced was the Stationary Source Assessment No. 42-21-0562-88. The data that follows was used in lieu of emission factors since both hospitals have wastes that are similar in content and systems that are similar in design. Note that all values are based on the average of three runs performed during the stack test form 31 August to 4 September 1987. Since the feed rate of the subject incinerator is larger than that of the referenced incinerator, a ratio between feed rates and HCl emissions was made for the estimation.

Referenced Incinerator	
Charging Rate	203 lb/hr
Particulate Emission Rate	0.94 lb/hr
NOx Emission Rate	0.26 lb/hr
HC1 Emission Rate	0.48 lb/hr
Subject Incinerator	
Charging Rate	300 lb/hr
Particulate Emission Rate	1.39 lb/hr
NOx Emission Rate	0.38 lb/hr
	0.709 lb/hr

PART B: LIST OF TOXIC AIR POLUTANTS, SCREENING LEVELS, AND MAXIMUM PREDICTED OFF-SITE CONCENTRATIONS

List screening levels and highest estimated off-site concentrations (ug/m^3) resulting from <u>premises-wide allowable emissions</u>(1) of each Toxic Air Pollutant that is covered by the regulations. Supporting documentation <u>must</u> be attached.

	TOXIC AIR POLLUTANT	CAS NUMBER	SCREENING LEVEL(S) 1-HR 8-HR ANNUAL	CONCENTRATIONS 1-HR 8-HR ANNUAL
1	Hydrogen chloride	7647-01-0	70ug/m ³	101ug/m ³
2				
·				
4				
5				
6	· .			
7				
. 8	·			

(1) Premises is defined as: "all the installations or other sources that are located on contiguous or adjacent properties and that are under the control of one person or under common control of a group of persons" (COMAR 26.11.15.01B (12)).

Allowable Emissions are defined as: "the maximum emissions a source for installation is capable of discharging after consideration of any physical or operational limitations required by this subtitle or by enforceable conditions included in an applicable air quality permit to construct, permit to operate, secretarial order, plan for compliance, consent agreement, or court order" (COMAR 26.11.15.01B (2)).

PART C: SECOND TIER ANALYSIS

This part should only be filled out if Second Tier Analysis is being used to demonstrate compliance. A detailed technical report must be attached to this form. In simple language, summarize the Second Tier Analysis in the space below.

Using EPA screening model procedures, the impacts at the building and concentrations up to 300 meters from the incinerator were calculated a worst-case weather condition was assumed.

The maximum HCl concentration occurred at 54 meters downwind which is about half the allowable concentration.



U. S. ARMY ENVIRONMENTAL HYGIENE AGE

REPLY TO ATTENTION OF

HSHB-ME-AQ (40)

21 JUN 1990

MEMORANDUM FOR Commander, Walter Reed Army Medical Center, ATTN: HSHL-EH (Mr. Henley), Washington, DC 20307-5000

SUBJECT: Ambient Air Quality Consultation No. 43-21-0721-90, Walter Reed Army Medical Center (WRAMC) Hospital Incinerator, Forest Glen, Maryland, 28-30 May 1990

- 1. REFERENCES. Enclosure 1 contains a listing of references used in this report.
- 2. AUTHORITY. AEEA Form 250-R. WRAMC, 14 May 1990.
- 3. PURPOSE. Determine compliance of hydrogen chloride emissions from the WRAMC Hospital Incinerator located at Forest Glen with Maryland air toxic regulations.
- 4. GENERAL.
- a. <u>Personnel Contacted</u>. The following personnel were contacted during this consultation.
 - (1) Mr. Henry Henley, Director, Directorate, Engineering and Housing.
- (2) Mr. Ron Waldron, Engineering Technician, Planning and Environmental Division, Directorate, Engineering and Housing.
 - b. <u>Background</u>. A preliminary study by this Agency showed that the WRAMC Hospital Incinerator, Forest Glen, Maryland, could possibly be in noncompliance with toxic air pollutant ambient air concentrations for hydrogen chloride (HGI) set forth by Code of Maryland Regulations (COMAR) 26.11.15.07(B) (reference 1). Additional modeling, requested by WRAMC, was subsequently performed using the Environmental Protection Agency's (EPA) <u>Screening Procedures for Estimating the Air Quality Impact of Stationary Sources</u> (reference 2) to determine the compliance status of the incinerator. The results of this modeling procedure are outlined in this document.

Distribution limited to U.S. Government agencies only: protection of privileged information evaluating another command; Jun 90. Requests for this document may be referred to Cdr, Walter Reed Army Medical Center, ATTN: HSHL-EH, Washington, DC 20307-5000.

DESTRUCTION NOTICE - Destroy by any method that will prevent disclosure of contents or reconstruction of the document.

D-28

HPED 584 3656

22:60 06/17/90

HSHB-ME-AQ SUBJECT: Ambient Air Quality Consultation No. 43-21-0721-90, Walter Reed Army Medical Center (WEAMC) Hospital Incinerator, Forest Glen, Maryland, 28-30 May 1990

- c. Evaluation Technique. Pollurant concentrations were calculated based on EPA's Screening Procedures for Estimating the Air Quality Impact of Stationary Sources document (reference 2). The model incorporates the effects of building downwash on maximum concentrations both near the source and at user-input intervals. For this case, simple terrain was assumed, and the source was modeled using a virtual point source procedure. The distance from the incinerator to the point of maximum pollutant concentration was determined, as well as HCl concentrations at the nearest post boundary and at designated intervals of 10, 100, 200, and 300 meters. The model examines a range of stability classes and wind speeds to identify the "worst-case" mateorological conditions that would result in the maximum ground-level concentrations. These combinations are presented in the output included in Enclosure 2.
- d. Model Input Data. Building dimensions used for downwash calculations, and incineration operation parameters used in the modeling analysis, were obtained from references 3 and 4 and are summarized in Table 1. Since the WRAMC incinerator has not had a stack emissions test, the emission data from Bayne-Jones Army Community Hospital (BJACH) Incinerator, Fort Polk, Louisiana (reference 5) are applied for this assessment. The selection of the BJACH was made due to its similarity to the WRAMC incinerator. A summary of the emission test data is given in Enclosure 3, with information specific to this project also presented in Table 1.

TABLE 1. MODEL INPUT DATA.

Source Type	Point
Emission Rate (g/s)	0.089
Stack Height (m)	10.36
Stack Inside Diameter (m)	0.38
A	9.3
Stack Gas Exit Temperature (K)	823.0
Ambient Air Temperature (K)	293.0
Receptor Height (m)	0.0
Terrain	Urban
Building Height (m)	8.53
Min Horiz Bldg Dim (m)	44.82
Max Horiz Bldg Dim (m)	53.79

^{. 5.} FINDINGS AND DISCUSSION. Maximum 1-hour concentrations of HCl were calculated at intervals of 10, 100, 200, and 300 moters from the incinerator and at the nearest post boundary, approximately 258 meters south of the incinerator. In addition, the point of maximum HCl concentration was

HSHB-ME-AQ SUBJECT: Ambient Air Quality Consultation No. 43-21-0721-90, Walter Reed Army Medical Center (WRAMC) Hospital Incinerator, Forest Glen, Maryland, 28-30 May 1990

determined to occur at 54 meters downwind of the incinerator stack. Table 2 summarizes these results.

TABLE 2. HC1 AMBIENT AIR CONCENTRATIONS.

DISTANCE (m)	Concentration (ue/m³)	ALLOWABLE CONCENTRATION (Ug/m³)*	
10	0.0	70	
. 54	35.45	70	
100	25.02	- 70 ·· · · -	
200	12.68	70	
300	9.48	70	

*Code of Maryland Regulations

6. CONCLUSION. Based on the results obtained using EFA's acreening model and comparison to the allowable ambient air concentrations set forth by COMAR 26.11.15.07 (B), the WRAMC Hospital Incinerator located at Forest Glen, Maryland, is not expected to exceed standards for HCl emissions.

7. RECOMMENDATIONS. Coordinate these findings with the State of Maryland.

FOR THE COMMANDER:

3 Encls

ester y. Pilcher

MAJ, MS

Chief, Air Pollution Engineering Division

CF:

EQDA(SGPS-PSP)

HQDA(ENVR-E)

DA, USAPHSC, ATTN: CEHSC-P

Cdr. HSC, ATTN: HSCL-P

Cdr. WRAMC, ATTN: PUNTMED Svc (2 cy)

Cdr. USATHAMA, ATTN: CETHA-TE-E

Cdr, USATHAMA, ATTN: CETHA-RM(TIC) (2cy)

Cdr, USAEHA-N

REFERENCES

- 1. Memorandum for Commander, WRAMC. ATTN: HSHL-EH, 8 March 1990, subject: Air Toxics Compliance Demonstration for the WRAMC Hospital Incinerator located in Forest Glen, Maryland.
- 2. EPA Draft 450/4-88-010, August 1988, Screening Procedures for Estimating the Air Quality Impact of Stationary Sources.
- 3. Walter Reed Army Medical Center General Site Map, Forest Glen Section (Maryland), Drawing Number 931-10-09, October 1987.
- 4. Memorandum for Commander, WRAIR, ATTN: Safety Officer, 23 February 1990, subject: Incinerator Information.
- 5. Stationary Air Pollution Source Assessment No. 42-21-0562-88, Pathological Waste Incinerator, Bayne-Jones U.S. Army Community Hospital, Fort Polk.

 Louisiana, 31 August 4 September 1987.

Encl I

```
SCREEN-1.1 MODEL RUN ***
+** VERSION DATED 88300 ***
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RAMC HCL Emissions

IMPLE TERRAIN INDUTS: SOURCE TYPE POINT EMISSION RATE (G/S) .8900E-01 STACK HEIGHT (M) 10.36 STK INSIDE DIAM (M) . 38 STR EXIT VELOCITY (M/S) = STK GAS EXIT TEMP (K) = 9.30 823.00 AMBIENT AIR TEMP (K) 293.00 RECEPTOR HEIGHT (M) . .00 IDPT (1=URB, 2=RUR) 1 BUILDING HEIGHT (M) 8.53 MIN HORIZ BLDG DIM (M) =

IOY. FLUX = 2.12 M**4/S**5; MOM. FLUX = 1.11 M**4/S**2.

44.82

53.79

* FULL METEOROLOGY ***

MAX HORIZ BLDG DIM (M) =

****** . SCREEN AUTOMATED DISTANCES ***

* TERRAIN HEIGHT OF O. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M*#3)	STAR	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
10. 100. 200. 300.	.0000 25.02 12.68 9.477	0 4 4 4	.0 3.0 2.0 1.0	.0 3.0 2.0 1.0	.0 940.0 440.0 320.0	.0 :4.4 20.3 39.6	.0 15.7 20.8 45.4	.0 13.8 27.2 40.2	NA 85 89 5 3
KIMUM 54.	1-HR CONCENT 35.45	RATION 4	AT OR	BEYOND 3.0	10. M: 960.q	12.7	8.7	7.6	53

JASH= MEANS NO CALC MADE (CONC = 0.0) IASH=NO MEANS NO BUILDING DOWNWASH USED IASH=HS MEANS HUBER-SNYDER DOWNWASH USED IASH-85 MEANS SCHULMAN-SCIRE DOWNWASH USED IASH-NA MEANS DOWNWASH NOT AFFLICABLE, XKC*LS

Encl 2

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	TACK GAS DATA			
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Incla.

*** SCREEN DISCRETE DISTANCES X4+ O. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCE. *** TERRAIN HEIGHT OF CONC DIST UIOM USTK MIX HT PLUME SIGMA EIGMA (UG/M##3) STAB (M/S) (M/S) (M) HT (M) (M) Y (M) - Z (M) 258. 1.0 320. Q 39.3 10.74 1.0 39.4 34.8 DWASH= MEANS NO CALC MADE (CONC = 0.0) DWASH=NO MEANS NO BUILDING DOWNWASH USED DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3+LB *** CAVITY CALCULATION - 1 *** *** CAVITY CALCULATION - 2 *** CONC (UG/M**3) = CRIT WS @10M (M/S) = CRIT WS @ HS (M/S) = :0000 CONC (UG/M++3) -.0000 CRIT WS @10M (M/S) = CRIT WS @ HS (M/S) = 99.99 77.99 99.99 99.99 DILUTION WS (M/S) 99.99 DILUTION WS (M/S) 99.99 CAVITY HT (M)
CAVITY LENGTH (M) CAVITY HT (M) CAVITY LENGTH (M) 9.53 = 8.53 = 36.54 33.90 - ALONGWIND DIM (M) ALONGWIND DIM (M) CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S. CONC SET = 0.0 *** SUMMARY OF SCREEN MODEL RESULTS *** ********** CALCULATION -MAX CONC DIST TO TERRAIN PROCEDURE (UG/M++3) MAX (M) HT (M)

54.

0. ...

-- REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS --

35.45

D-34 9992 989 CEdy

90:50 06:TZ/90

SIMPLE TERRAIN

PART D: SPECIAL PERMIT

This part should only be filled out if a Special Permit has been approved by the Department.

<u>Summary of T-BACT Demonstration</u>: List all emission reduction options considered in determining T-Bact starting with the option that reduces emissions the most.

EMISSION REDUCTION & EMISSION ANNUAL OPTION REDUCTION CAPITAL OPERATING

1
2
3

Identify the emission reduction option proposed as T-BACT and briefly explain why this is the appropriate selection.

Summary of Risk Assessment: Briefly summarize the required source specific risk assessment in the space below.



	ARTMENT OF THE ENVIRONMENT AIR MANAGEMENT ADMINISTRATION 2500 BROENING HIGHWAY BALTIMORE, MARYLAND 21224	Robert Perciasepe MartintMcMetshythe Secretary
Construction Permit	X Operating Permit	
PERMIT NO15-00983	Date Issued March 1, 1991	
PERMIT FEE \$200.00	Expiration Date February	29, 1992
LEGAL OWNER & AD Walter Reed Army Insti	itute of Montgomery Count	.y
Department of Animal E Bldg. 511, Kelser Sect Forest Glen, MD 20910		
	SOURCE DESCRIPTION —————	
Consumat Model C-125-P	P Special Medical Waste Incinerator rated	at
This permit is issued compliance with all ap	subject to the attached terms and conditionable laws and regulations.	lons, and

D-36

Page 1 of 3

(NOT TRANSFERABLE)

AMA-1 (Rev. 10-1-89) MDE 130

WALTER REED ARMY INSTITUTE OF RESEARCH OPERATING PERMIT NO. 15-00983

This permit is subject to the following terms and conditions:

Part A - General

1. Except as otherwise provided in the following provisions, the Company's application is incorporated as part of this Permit to Operate. That application consists of the original application signed by the Company on February 5, 1991 and all amendments to the application. If there are any discrepancies between the permit conditions specified below and the application, the conditions on this permit will take precedence.

2. Right of Entry:

The Secretary, Department of the Environment, or the Secretary's authorized representative, including inspectors of the Air Management Administration shall be afforded access to the Company's property, at reasonable times and upon presentation of credentials:

- a. to determine compliance with the permit and applicable regulations;
- b. to sample any waste, air, or discharge into the
- atmosphere;
 c. to inspect any monitoring equipment required by this
 permit or applicable regulations;
- d. to have access to and copy any records required to be
- kept by this permit or by applicable regulations; and e. to obtain any photographic documentation or evidence.
- 3. The sources and equipment covered by this permit are subject to:
 - a. all rules and regulations of Title 26. Subtitle 11, Air Quality, of the Code of Maryland Regulations including specific requirements that appear at COMAR 26.11.06, COMAR 26.11.08 and COMAR 26.11.15;
 - b. all terms and conditions required by construction permits, NSINA approvals, and PSD approvals issued by the Department unless superseded by subsequent permits.
- 4. <u>Severability</u>: If any provision of this permit shall be held invalid for any reason, the remaining provisions shall remain in full force and effect, and such invalid provision shall be considered severed and deleted from this permit.

Page 2 of 3

WALTER REED ARMY INSTITUTE OF RESEARCH

- Nothing in this permit authorizes the violation of any rule or regulation nor the creation of a nuisance or air pollution.
- 6. The Company shall report periods of excess emissions to the Department as required by COMAR 26.11.01.07.

Part B - Operation

- The Company shall keep all air pollution control equipment, including the refractory lining, burners, and thermocouples, properly maintained and in good working order so as to assure full and continuous compliance with all applicable regulations.
- The control panel instrumentation for the incinerator and control equipment shall be kept properly maintained and operating at all times so as to accurately indicate operating conditions.

15-00983

Page 3 of 3

STATE OF MARYLAND-DEPARTMENT OF THE ENVIRONMENT

Air Management Administration 2500 Broening Highway Baltimore, Maryland 21224

	2500 Broeni		
	Baltimore, Ma	ryland 21224	A B B B B B B
	APPLICATION FOR PERMIT T	O OPERATE INCINERATO	ا ا ا
<u>~</u>		·	103 7 7 1991 17
I. PREMISE	EIDENTIFICATION: -		AIR MANAGEMENT AC THISTRATION
Ì	Department of Animal Resources,	Div Veterinary Medi	cine
	PREMISE NAME OR IDENTIFICATION		PREMISE NUMBER
J	Walter Reed Army Institute of R	Research	
Ĭ	Bldg 511, Kelser Section, Fores	t Glen. Md 20910	COUNTY
l	PREMISE ADDRESS		
L			
II. EQUIPA	ENT IDENTIFICATION:		
UNIT	TYPE EQUIPMENT	LBS/HR	REGISTRATION NO.
<u>,~ </u>	(By-product waste, municipal, etc.)	(Design)	
	- state description to	-	
1	Consumate Model C-125-P	350	1579200126
ŀ			
, ,			
1			
III. AMOU	NT AND DESCRIPTION OF WASTE BEING INCINERATED:		
UNIT	AMOUNT (Tony/Year)	DESCRIPTION OF WASTE	· .
<u>l. </u>	(Tons/Year)		
•	75Pathol	ogical Waste	
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	•		
IV. DESCR	IPTION OF AIR POLLUTION CONTROL DEVICE		
l			GRAIN LOADING
UNIT	TYPE CONTROL DEVICE		(at 12% CO ₂)
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	\	SIGNATURE	AND TITLE
	1	CHARLES P. RAFLO, CO	
		Director, Div Vet Me	d. WRAIR
	-	DATE OF THE PARTY	
			SFeb-91
~	D-3	39 .	

AMA-27

DO NOT WRITE BELOW THIS LINE

FIELD REPORT

DATE OF INSPECTION:

E. Lee Haskins A. M. A.

2-27-91

Taimage Mitchell

DISCUSSION, CONDITIONS AND RECOMMENDATION:

The permit to operate inspection for the Consumat (Model C-125-P) special medical waste incinerator was conducted on February 27, 1991. The unit was operating upon my arrival. The unit was charged with approximately 85 lbs of animal waste and bedding. The upper and lower burner temperatures were 1600 F and 1100 F, respectively. An eighteen minute visible emissions evaluation was conducted. Opacity remained at 0% for the duration of this evaluation. After the visible emissions test, the upper and lower burner temperatures were 1650 F. and 1100 F. respectively.

The unit appears to be opearting in compliance, and is well maintained. There were no changes in operation during the past year. Routine maintenance is performed on a quarterly basis, by an outside contractor. There were no complaints received and no violations noted during the past year.

Lao

STATE OF MARYLAND DEPARTMENT OF THE ENVIRONMENT

Air Management Administration 2500 Broening Highway Baltimore, Maryland 21224

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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				_	Λ -	Time	At Star	rt Of O	oservation	7)	<u> </u>		
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Point of Observati	ion So of	oloch						[Detached				
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(A-19 Revised 10	P-1-81 4 1				D-4	1 -							



Governor 2500 BROE	IT ADMINISTRATION NING HIGHWAY MARYLAND 21224	Martin W. Waish, Secretary
Construction Permit X	Operating Permit	
PERMIT NO. 15-00983	Date Issued March 1, 199	0
PERMIT FEE \$200.00	Expiration Date February 28	, 1991
PERMIT FEE \$200.00 LEGAL OWNER & ADDRESS Walter Reed Army Institute of Research Bepeatment of Animal Resources Forest Glen, MD 20910	SITE Building 511 Kelser Section Montgomery County	, 1991

This permit is issued subject to the attached terms and conditions, and compliance with all applicable laws and regulations.

AMA-1 (Rev. 10-1-89) MDE 130

D-42

(NOT TRANSFERABLE)

WALTER REED ARMY INSTITUTE OF RESEARCH

OPERATING PERMIT NO. 15-00983

This permit is subject to the following terms and conditions:

Part A - General

Except as otherwise provided in the following provisions, the Company's application is incorporated as part of this Permit to Operate. That application consists of the original application received by the Air Management Administration (AMA) on DECEMBER 8, 1989 and all amendments to the application. If there are any discrepancies between the permit conditions specified below and the application, the conditions on this permit will take precedence.

Right of Entry: 2.

The Secretary, Department of the Environment, or the Secretary's authorized representative, including inspectors of the Air Management Administration shall be afforded access to the Company's property, at reasonable times and upon presentation of credentials:

- to determine compliance with the permit and applicable regulations;
- to sample any waste, air, or discharge into the b. atmosphere;
- to inspect any monitoring equipment required by this c. permit or applicable regulations;
- to have access to and copy any records required to be đ. kept by this permit or by applicable regulations; and to obtain any photographic documentation or evidence.
- The sources and equipment covered by this permit are subject
 - all rules and regulations of Title 26. Subtitle 11, Air a. Quality, of the Code of Maryland Regulations including specific requirements that appear at COMAR 26.11.06 and COMAR 26.11.08/26.11.15.
 - all terms and conditions required by construction permits, NSINA approvals, and PSD approvals issued by the Department unless superseded by subsequent permit.

Page 2 of 3

WALTER REED ARMY INSTITUTE OF RESEARCH

- 4. <u>Severability</u>: If any provision of this permit shall be held invalid for any reason, the remaining provisions shall remain in full force and effect, and such invalid provision shall be considered severed and deleted from this permit.
- 5. Nothing in this permit authorizes the violation of any rule or regulation nor the creation of a nuisance or air pollution.

Part B - Operation

- The Company shall keep all air pollution control equipment, including the refractory lining, burners, and thermocouples, properly maintained and in good working order, so as to assure full and continuous compliance with all applicable regulations.
- 2. The Company shall report periods of excess emissions to the Department as required by COMAR 26.11.01.07.
- 3. The Control panel instrumentation for the incinerator and control equipment shall be kept properly maintained and operating at all times so as to accurately indicate operating conditions.

Page 3 of 3

STATE OF MARYLAND-DEPARTMENT OF THE ENVIRONMENT Alr Management Administration 2500 Broening Highway Baltimore, Maryland 21224

APPLICATION FOR PERMIT TO OPERATE INCINERATORS

<i>;</i>	APPLICATION FOR FERMINT	10 01 5		
PREMI	LE IDENTIFICATION:			
- ~ = m11	Department of Animal Resources, Div Ve	terinary Mad	icina	•
	Walter Reed Army-Institute of Research			
	PREMISE NAME OR IDENTIFICATION			PREMISE NUMBER
	Dida Ell Volcon Station State Clar	MD 20910		
	Bldg 511, Kelser Section, Forest Glen,	VED 50310		Montgomery
	FURMING RESIDENCE	1 1		
FOUI	MENT IDENTIFICATION			
	• •	•		REGISTRATION NO.
U	TYPE EQUIPMENT (Systemate waste, municipal, etc.)		LBS/HR (Design)	
	•			
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	Consumate Model C-125-P		350	1579200126
	Hardward and the subsection was food			<i>i</i>
	Equipped with automatic ram feed			
AMO	UNT AND DESCRIPTION OF WASTE BEING INCINERATED:			
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_	(Tens/Year)		•	•
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	75 Pathological	114370		
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. DES	CRIPTION OF AIR POLLUTION CONTROL DEVICE			•
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		Mas	SIGNATU	REAND TITLE A
		CHARLES F	RAFLO, CO	L, VC
	•	Director,	Div Vet Me	d, WRAIR Y (M. SAC)
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D-45.

The permit to operate inspection for the Consumat model C-125-P was conducted on March 27, 1990.

The unit was operating upon my arrival. I observed as the unit was charged with approximately 150 lbs of animal waste. The upper and lower burner temperatures were 1800 F and 950 F respectively. I then proceeded to record stack emissions for a fifteen minute period. Opacities remained constant at 0%.

There were no changes in operation during the past year. The unit is operated 52 days per year. Routine maintenance is preformed on a quarterly basis. The refractory lining was replaced prior to last years' inspection. There were no complaints received and no violations noted during the past year.

I recommend that the annual permit to operate be issued. $\label{eq:commend} \mbox{\em MNVC}$

STATE OF MARYLAND DEPARTMENT OF THE ENVIRONMENT

Air Management Administration 2500 Broening Highway Baltimore, Maryland 21224

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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rremise Name	Wa	/ten	Roo											
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Remarks: CA	ري ري	ky e	and it	1,0m S	. Sun t-	124								
AMA-19 Revised 10-1-1 DENV 137		. bni	1 cha soll	ifed w	mel -16	;:32 (14**		me of C)bserver	: <u>]]l. f</u>	moe			

Secretary	1, Jr.		ESTON STREET MARYLAND 21201	4	
	Construction Permit	x	Operating Permit		
AIR MANAG	SEMENT ADMINISTRA	ATION	•		
PERMIT NO) 15 -0983-2-01	.26	Date Issued	Warch 1, 1989	
PERMIT FE	E NONE		Expiration D	ate Fabruary 28, 1990	
	LEGAL OWNER & AD				
Departme Forest G ATTM: 0	nt of Animal Relen, (II) 20910 harles F. Rafle irector, Div. o Consumat mode	, COL, VO f Vet. Med. INSTALLATION 1 C-125-P infect an 350 t	estion data	Building 511 Relser Section Montgomery County moineracor dated of this permit an ha resummittee.	
				,	
	11. 12 2 7.	and a	X local	ernent Administration	

AMA-27 April 1, 1973

STATE OF MARYL

Office of Environmental Programs
Air Management Administration
P.O. Box 13387

JAN 27 1989 Baltimore, Maryland 21203

DHMH 78

APPLICATION FOR PERMIT TO OPERATE INCINERATORS AIR MANAGEMENT

·			ADMINISTRATION.
I. PREMIS	E IDENTIFICATION:		
	Department of Animal Resources, Div Vet Walter Reed Army Institute of Research	erinary Medic	ine
	PREMISE NAME OR IDENTIFICATION .		PREMISE NUMBER
•	Bldg 511, Kelser Section, Forest Glen,	Md, 20910	Montgomery
II. EQUIP	MENT IDENTIFICATION:		
UNIT	TYPE EQUIPMENT	LBS/HR	REGISTRATION NO.
<u> </u>	(Sy-product waste, municipal, etc.)	(Design)	-
_			
1	Consumate Model C-125-P	350	1579200126
	Design of with subspatia ram food		
2	Equipped with automatic ram feed		
III. AMOU	NT AND DESCRIPTION OF WASTE BEING INCINERATED:		
		•	
UNIT	AMOUNT DESCRIP	TION OF WASTE	
	5 - mine - mail		
· ·	75 Pathological Waste		
1	75 Pathological waste	•	
2			
IV. DESCR	RIPTION OF AIR POLLUTION CONTROL DEVICE		
UNIT	TYPE CONTROL DEVICE		GRAIN LOADING
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1	N/A		,
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v. 🗆 v	OS NO ON-SITE TESTS PERFORMED		
		UNIT TO BE TESTED	Date
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	Brake	Il Good	LIEVC
		SIGNATURE A	
	CHARLES Directo	P. RAFLO, CO or, Div Vet Me	d, WRAIR
	/ Directo	DAT	26 1 89

FIELD REPORT

}		
INSPECTOR:	DATE OF INSPECTION:	PERSON CONTACTED:
22	s Tourism to the second	
7		Talmage Mitchell
Laramie Rude	2–13–89	Ottawa Ward

DISCUSSION, CONDITIONS AND RECOMMENDATION:

Inspection of the Consumat model C-125-P infectious waste incinerator. Unit was preheated at time of arrival. Incinerator was charged with 150 pounds of waste consisting of animals, animal parts and wastes. Conducted a visible emissions test. There were no smoke emissions present during the test observation. The incinerator was burning with temperatures of 1800°F in the upper chamber and 1000°F in the primary chamber. No problems noted.

There were no changes in operation during the past year. Routine maintenance and repairs were conducted including refractory lining replacement and burner adjustments. There were no complaints received and no violations noted during the past year.

Recommend that the annual permit to operate be issued.

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STATE OF MARYLAND DEPARTMENT OF THE ENVIRONMENT

Air Management Administration O'Conor Building 201 West Preston Street Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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Point of Discharge									None				
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'A-19 Revised 10-1-81 DENV 137	l	•			D-51								



DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS 201 W. PRESTON STREET

Atlance/Itzack, File links, Jr. BALTIMORE, MARYLAND 21201 **Construction Permit Operating Permit DHS Facility Permit** AIR MANAGEMENT ADMINISTRATION PERMIT NO. _____15-0983-2-0126 March 1. 1988 Date Issued . NONE PERMIT FEE_ February 28, 1989 Expiration Date. LEGAL OWNER & ADDRESS SITE Walter Reed Army Institute of Research Department of Animal Resources Building 511 Forest Glen, MD 20910 Kelser Section ATNT: Charles P. Raflo, COL, VC Director, Div. of Vet. Med. Montgomery County INSTALLATION DESCRIPTION Consumat model C-125-P infectious waste incinerator rated at 350 lbs./hr. Sixty (60) days prior to expiration date of this permit an application for a permit to operate shall be resubmitted. (NOT TRANSFERABLE)

D-52

MAA-1 (Box. 2-1-79) CHIMH 1889

STATE OF MARYLAND - DEPARTMENT OF HEALTH AND ... ENTAL HYGIENE

Office of Environmental Programs Air Management Administration P.O. Box 13387 Baltimore, Maryland 21203

APPLICATION FOR PERMIT TO OPERATE INCINERATORS UAN 28 1988

I. PREMI	SE IDENTIFICATION:		ALC: ALANA GENERALE
÷	Department of Animal Resources, Div Ve Walter Reed Army Institute of Research	terinary Me	AIR MANAGEMENT diciabministration
	PREMISE NAME OR IDENTIFICATION		PREMISE NUMBER
	Bldg 511, Kelser Section PREMISE ADDRESS		COUNTY
_	Forest Glen, Md. 20910		
II. EQUIP	MENT IDENTIFICATION:		
UNIT	TYPE EQUIPMENT (By-product waste, municipal, etc.)	LBS/HR (Design)	REGISTRATION NO.
	and the second of the second o		
1	Consumate Model C-125-P	350	1579200126
2	Equipped with automatic ram feed		
. AMOL	INT AND DESCRIPTION OF WASTE BEING INCINERATED:		
UNIT	AMOUNT DESCRIP	TION OF WASTE	•
T.,			
	75 Pathological Waste		
2			
IV. DESCI	RIPTION OF AIR POLLUTION CONTROL DEVICE		
TY.	TYPE CONTROL DEVICE		GRAIN LOADING
er:			,
•	_N/A		
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v. 🗆 v	ON NO ON-SITE TESTS PERFORMED	•	
		UNIT TO BE TES	TED
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		P. RAFLO,	
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-	D-53		
27 April	1. 1973		· · · · · · · · · · · · · · · · · · ·

DO NOT WRITE BELOW THIS LINE

FIELD REPORT

INSPECTOR

DATE OF INSPECTION:

PERSON CONTACTED:

Laramie Rude JR

February 4, 1988

Talmage Mitchell Mr. Fitzgerald

DISCUSSION, CONDITIONS AND RECOMMENDATION:

Inspection of the Consumat model C-125-P infectious waste incinerator. Unit was preheated at time of arrival and charged with 125 lbs. of animals and animal wastes. Incinerator was operating with temperatures of 18000F in the upper chamber and 15000F in the main chamber. Conducted a visible emission test and no smoke emissions were present during observation. No problems noted.

There were no changes in operation during the past year. The automatic ram feed was replaced in 1987 and the refractory lining was redone. No complaints or violations were filed during the past year.

Recommend that the annual permit to operate be issued.

Levi

DEPARTMENT OF THE ENVIRONMENT

Air Management Administration O'Conor Building 201 W. Preston Street Baitimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

	Date2-4-88
	Time At Start Of Observation 10: 35AM
mise Name Walter Reed	
ddress Forest Glen	_ country Montgomery
ype of Installation inschious Waste incinerate	
int of Discharge incinerator stack	None
oint of Observation NEOS-lack-305+	Steam Plume Attached Detached
ky Conditions Overcast - rain	Ambient Temperature 35°F
	Wind Speed 5-8 mph
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DEPARTMENT OF HEALTH AND MENTAL HYGIENE

AIR MANAGEMENT ADMINISTRATION PERMIT NO. 15-0983-2-0126 Date Issued March 1, 1987 PERMIT FEE None Expiration Date February 29, 1988 LEGAL OWNER & ADDRESS Walter Reed Army Institute of Research Department of Animal Resources Forest Glen, Maryland 20910 Attn: Robert J. Beattie, COL, VC INSTALLATION DESCRIPTION Consumat model C-125-P infectious waste incinerator rated at 350 lbs./hour. Sixty (60) days prior to expiration date of this permit an application for a permit to operate shall be resubmitted.
PERMIT NO
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application for a permit to operate shall be resubmitted.
Donald Chiling & PP
Administrator, Engineering and Enforcement Program Director, Air Management Administration
(NOT TRANSFERABLE)
1-79 Ornari 1609

STATE OF MARYLAND - DEPARTMENT OF HEALTH AND MANTAL HYGIENE
Office of Environmental Programs
Air Management Administration
P.O. Box 13387
Baltimore, Maryland 21203

APPLICATION FOR PERMIT TO OPERATE INCINERATORS

I. PREM	IISE IDENTIFICATION:		
: 1	Walter Reed Army Institute of Re	search	
	Department of Animal Resources,	Div of Veterinary M	edicine /5-0983
	PREMISE NAME OR IDENTIFICATION		PREMISE NUMBER
, 	Bldg 511, Kelser Section		Montg
	PREMISE ADDRESS		COUNTY
į	Forest Glen, Md. 20910		
II. EQU	IPMENT IDENTIFICATION:		
UNIT	TYPE EQUIPMENT (By-product waste, municipal, etc.)	LBS/HR (Design)	REGISTRATION NO.
:			
1	Consumate Model C-125-P	350	1579200126
2	Equipped with automatic ram fee	ed.	
,			
III. AMO	OUNT AND DESCRIPTION OF WASTE BEING INCINERATED:		
UNIT	AMOUNT	DESCRIPTION OF WASTE	
	(Tons/Year)		. •
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1	Pathologic	cal Waste	
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AMA-27 April 1, 1973

DHMH 76

DO NOT WRITE BELOW THIS LINE

FIELD REPORT

IARAMIE Rude ## February 10, 1987 February 10, 1987 Talmage Mitchell Mr. Fitzgerald

DISCUSSION, CONDITIONS AND RECOMMENDATION:

Inspection of the Consumat model C-125P infectious waste incinerator. Unit was preheated and charged with 150 lbs. of waste. Conducted a 15 minute visible emissions test. Smoke emissions appeared after 6 minutes of observation with up to 25 percent opacity for 3 minutes. Mr. Fitzgerald made a check and noted that a box of classified paper waste had been charged into the incinerator and was not burning completely. I informed Mr. Fitzgerald that the incinerator is permitted for burning infectious waste only. Another means of disposal will have to be made for the classified papers. No other problems noted.

The incinerator was operating at temperatures of 15000F in the upper chamber and 110 in the main chamber. There have been no changes in operation over the past year. No complaints or violations received during the past year. Recommend that the annual permit to operate be issued.

FOR SECTION SE

D-58

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS Air Management Administration O'Conor Building 201 W. Preston Street Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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	State of Maryland
	DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS 201 W. PRESTON STREET Adele Wilzack, R.N., M.S. BALTIMORE, MARYLAND 21201 William M. Eichbaum Assistant Secretary for
	Secretary Environmental Programs
	Construction Permit X Operating Permit DHS Facility Permit
	AIR MANAGEMENT ADMINISTRATION
-	PERMIT NO. 15-0983-2-0126 Date Issued March 1, 1986
	PERMIT FEE None Expiration Date February 28, 1987
	LEGAL OWNER & ADDRESS SITE
	Walter Reed Army Institute of Research Building 511
	Department of Animal Resources Kelser Section
()	Forest Glen, Maryland 20012 Montgomery County Attn: Robert J. Beattie, COL, VG
	INSTALLATION DESCRIPTION
	Consumat model C-125-P infectious waste incinerator rated at 350 lbs./hour.
	Sixty (60) days prior to expiration date of this permit an application for a permit to operate shall be resubmitted.
	Administrator, Engineering and Enforcement Program Director, Air Management Administration
(,	
1	- (NOT TRANSFERABLE)

AMA-1 (Bov. 2-1-70) DHMH 1980

STATE OF MARYLAND - DEPARTMENT OF HEALTH AND ML..TAL HYGIENE

Office of Environmental Programs
Air Management Administration
P.O. Box 13387
Baltimore, Maryland 21203

APPLICATION FOR PERMIT TO OPERATE INCINERATORS

I.C.REM	ISE IDENTIFICATION:			
	Walter Reed Army Institute of Re			0983
	Department of Animal Resources, PREMISE NAME OR IDENTIFICATION	Division of Ve	terinary Medicir	PREMISE NUMBER
- ,	Bldg 511 Kelser Section PREMISE ADDRESS	· · · · · · · · · · · · · · · · · · ·		Montgomery county
100	Forest Glen Md 20910 PMENT IDENTIFICATION:			
II. EQUI	PMENT IDENTIFICATION:			
UNIT	TYPE EQUIPMENT (By-product waste, municipal,	etc.)	LBS/HR (Design)	REGISTRATION NO.
1	Consumate Model C-125-P		350	1579200126
2	Equipped with automatic ram fe	eed		
II. AMO	UNT AND DESCRIPTION OF WASTE BEING INCINERA	TED:		
TIME.	AMOUNT (Tons/Year)	DESCRIP	TION OF WASTE	
1	75 Patholog	gical Waste		
2				
V. DESC	RIPTION OF AIR POLLUTION CONTROL DEVICE			
MIT	TYPE CONTROL DEVIC			GRAIN LOADING (at 12% CO ₂)
1	N/A			
2				
	Yes No ON-SITE TESTS PERFORMED			
	THE UNSTITE TESTS PERFORMED		UNIT TO BE TESTED	Date
]	RECEIVED			
	FEB 3 1996	Silve	Signature	Dix. Div Vet Med
	AIR MANAGEMENT ADMINISTRATION	ROBERT J. Director	BEATTIE, COL, Div Vet Med, W	VC RAIR 27 Jan 86
<u>.</u>		D-61		

*G-27 April 1, 1973

FIELD REPORT

Winner Devices

DATE OF INSPECTION

PERSON CONTACTED:

Laramie Rude

February 4, 1986

Talmage Mitchell Mr. Fitzgerald

DISCUSSION CONDITIONS AND RECOMMENDATION:

Inspection of Consumat model C-125-P infectious waste incinerator. Unit was pre-heated and charged with 150 lbs. of infectious waste. Conducted a visible emission test and incinerator was in compliance. Unit was operating at temperatures of 1800°F in the upper chamber and 1400°F in the main chamber. No problems noted. There have been no complaints or violations during the past year. Recommend that the annual permit to operate be issued.

Law

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS Air Management Administration

O'Conor Building 201 W. Preston Street Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS 201 W. PRESTON STREET BALTIMORE, MARYLAND 21201 William M. Eichbaum Adele Wilzack, R.N., M.S. Assistant Secretary for Environmental Programs Secretary **Operating Permit DHS Facility Permit** Construction Permit AIR MANAGEMENT ADMINISTRATION PERMIT NO. 15-0983-2-0126 March 1, 1985 Date Issued -Expiration Date February 28. 1986 PERMIT FEE_ LEGAL OWNER & ADDRESS SITE Walter Reed Army Institute of Research Building 511 Department of Animal Resources Kelser Section Forest Glen, Maryland 20012 Montgomery County Attn: William C. Cole, LTC - INSTALLATION DESCRIPTION -Consumat model C-125-P infectious waste incinerator rated at 350 lbs./hour. Sixty (60) days prior to expiration date of this permit an application for a permit to operate shall be resubmitted. PEZ - (NOT TRANSFERABLE)

3/4/85 _ D-64 _

AMA-1 (Rev. 2-1-79) DHMH 1589

STATE OF MARY __.ND · DEPARTMENT OF HEALTH ANL __ENTAL HYGIENE Office of Environmental Programs
Air Management Administration
P.O. Box 13387
Baltimore, Maryland 21203

APPLICATION FOR PERMIT TO OPERATE INCINERATORS

PREMISE	E IDENTIFICATION:		
	Walter Reed Army Institute of Research Department of Animal Resources, Division		983
	PREMISE NAME OR IDENTIFICATION		PREMISE NUMBER
	Bldg 511, Kelser Section		Montgomery
-	PREMISE ADDRESS		COUNTY
	Forest Glen, Md. 20910		
II. EQUIPA	MENT IDENTIFICATION:		•
UNIT	TYPE EQUIPMENT (By-product waste, municipal, etc.)	LBS/HR (Design)	REGISTRATION NO.
1	Consumate Model C-125-5	350	1579200126
2 .	Equipped with automatic ram feed		
III. AMOU	NT AND DESCRIPTION OF WASTE BEING INCINERATED:		<u>.</u>
UNIT	AMOUNT (Tons/Year)	DESCRIPTION OF WASTE	
1	75 Pathological Was	te	
2			
IV DESCR	IPTION OF AIR POLLUTION CONTROL DEVICE		•
UNIT	TYPE CONTROL DEVICE		GRAIN LOADING
<u> </u>	1775 3000 1000 1000		(at 12% CO ₂)
1	N/A		
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,	A'R MANAGEMENT ADM.NISTRATION _	ROBERT J.BEATTIE, COL, \	/C 14 Jan 85
	D-65	5	

FIELD REPORT

SPECTOR:

DATE OF INSPECTION:

PERSON CONTACTED:

Laramie Rude

yp

February 1, 1985

Talmage Mitchell Mr. Fitzgerald

DISCUSSION, CONDITIONS AND RECOMMENDATION:

Inspection of Consumat Model C-125-P infectious waste incinerator. Unit was in operation at time of arrival. No visible emission noted. Unit was charged with 150-200 lbs. of waste consisting of animals & animal parts (dogs, sheep & mice). Incinerator was operating at temperatures of 1400°F in the main chamber and 1800°F in the secondary chamber. Conducted visible emission test - no visible emission present. Unit in compliance. No problems noted. There have been no complaints or violations during the past year. Recommend that the annual permit to operate be issued.

Dw

MARYLAND ATE DEPARTMENT OF HEALTH AND ME. OFFICE OF ENVIRONMENTAL PROGRAMS Air Management Administration O'Conor Building 201 W. Preston Street Baitimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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D-67

Administrator, Engineering and Enforcement Program

REZ. (NOT-TRANSFERABLE)-3/27/89 D-68

AMA-1 (Rev. 2-1-79) DHMH 1589

100 27 April 1, 1973

STATE OF MARY ID - DEPARTMENT OF HEALTH AN IENTAL HYGIENE Environmental Health Administration

Bureau of Air Quality Control 610 N. Howard Street Baltimore, Maryland 21201

APPLICATION FOR PERMIT TO OPERATE INCINERATORS

	APPLICATION FOR TERMIT TO	01210112	-
L PRE	MISE IDENTIFICATION:		
	Walter Reed Army Institute of Research		
	Department of Animal Resources, Division of	Veterinary Medicine	983
	PREMISE NAME OR IDENTIFICATION		PREMISE NUMBER
	Building 511 Kelser Section		Montgomery
	PREMISE ADDRESS		COUNTY
	Forest Glen, Maryland 20910		
II. EQ	UIPMENT IDENTIFICATION:		
הה	TYPE EQUIPMENT (By-product waste, municipal, etc.)	LBS/HR (Design)	REGISTRATION NO.
1	Consumat Model C-125-5	350	1579200126
J	Equipped with automatic ram feed		
			<u> </u>
III. A	MOUNT AND DESCRIPTION OF WASTE BEING INCINERATED:		
UNIT	AMOUNT (Tony/Year)	DESCRIPTION OF WASTE	·
	75 Pathological Waste	• ,	
1	75 Facility Teath		
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4			
F_ 01	SCRIPTION OF AIR POLLUTION CONTROL DEVICE		
UNIT	TYPE CONTROL DEVICE		GRAIN LOADING (at 12% CO ₂)
			(at 12% CO ₂)
	N/A		
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√. □	Yes No ON-SITE TESTS PERFORMED		
~		UNIT TO BE TESTED	Date
		or or	T _6_
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*		SIGNATURE	AND TITLE
	·	CLIFFORD R. ROBERTS, CO	
•		DAT	E
***	D-69	***. 	-

DO NOT WRITE BELOW THIS LINE

FIELD REPORT

Laramie Rude Herb Janssen

3/12/84:

Mr. Mitchell Mr. Fitzgerald

DISCUSSION, CONDITIONS AND RECOMMENDATION:

Inspection of pathological waste incinerator for annual permit to operate. Incinerator was preheated + charged with 200 lbs waste. Conducted visible emission test. No visible emissions. See AMA-19.

No problems noted.

Recommend that annual permit to operate be issued.

Laramie Rude Du

D-70

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS

Air Management Administration O'Conor Building 201 W. Preston Street Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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D-71

OHMH 1841



DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS .201 W. PRESTON STREET BALTIMORE, MARYLAND 21201 William M. Eichbaum Assistant Secretary for Environmental Programs Charles R. Buck, Jr., Sc.D. Secretary **DHS Facility Permit** Construction Permit XX **Operating Permit** AIR MANAGEMENT ADMINISTRATION PERMIT NO. 0-00093-00126 Date issued __ March 1 1003 Expiration Date Fahrunry 20, 1084 SITE LEGAL OWNER & ADDRESS Building 511 Walter Reed Army Institute Kelser Section of Research Department of Animal Resources Montgomery County Forest Glen, Maryland 20012 Attn: William C. Cole, LTC - INSTALLATION DESCRIPTION Consumat model C-125-P infectious waste incinerator rated at 350 lbs./hour. Administrator, Engineering and Enforcement Program

(NOT TRANSFERABLE)

D-72

STATE OF MARYL D - DEPARTMENT OF HEALTH ANI ENTAL HYGIENE Environmental Health Administration

Bureau of Air Quality Control
610 N. Howard Street 20/60. Preston 57.
Baltimore, Maryland 21201

APPLICATION FOR PERMIT TO OPERATE INCINERATORS

	E IDENTIFICATION:			
	Walter Reed Army Institute of R	esearch		
	Department of Animal Resources,	Division of Veterina	ary Medicin	e 983
	PREMISE NAME OR IDENTIFICATION			PREMISE NUMBER
	Bldg 511 Kelser Section			Montgomery
	PREMISE ADDRESS Forest Glen, MD 20910			COUNTY
	MENT IDENTIFICATION:			
ij	TYPE EQUIPMENT (By-product waste, munici	pal, etc.)	(Design)	REGISTRATION NO.
	Consumat Model C-125-5	· ·	350 1bs	15/9200126
	Equipped with automatic ram			
AMOU	NT AND DESCRIPTION OF WASTE BEING INCINE	RATED:		
II	AMOUNT (Fons/Year)	DESCRIPTION	OF WASTE	
	75 Patholog	ical Waste		
DESCR	IPTION OF AIR POLLUTION CONTROL DEVICE			
IT.	TYPE CONTROL DE	<u>tvice</u>		GRAIN LOADING (at 12% CO ₂)
	N/A			
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DO NOT WRITE BELOW THIS LINE

FIELD REPORT

Douglas E. Frantz 2/17/83 Person contacted:

Mr. Fitzgerald

DISCUSSION, CONDITIONS AND RECOMMENDATION:

Unit was observed during charging of a full charge with no visible emissions. Recommend Issuance of annual permit. See AMA-19,

D. E. Frants

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS

Air Management Administration
O'Conor Building
201 W. Preston Street
Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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ਪੀਬ 1841 3**9 Revised 5-1-81**



DEPARTMENT OF HEALTH AND MENTAL HYGIENE

harles R. Buck, Jr., Sc.D. Secretary		RESTON STREET , MARYLAND 21201		William M. Eichb Assistant Secretar Environmental Prog
Construction Permit	X	Operating Permit	он	IS Facility Permit
AIR MANAGEMENT ADMINISTE PERMIT NO. 8-00983-2012		Date Issued	March 3, 1982	
PERMIT FEE None			February 28, 19	983
	•	CAPITATION DELE		
LEGAL OWNER & A		1	SITE	
Division of Veterina Forest Glen, Haryland	ry Medicine d 20012	Bldg. 5	ection	
Attns Clifford R. Re	* *	Montgome	ry County	
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	issued with the	proviso that in nt with the Depa d emissions are	fectious waste	
This permit is segregated and disp Guidelines effectiv	issued with the	proviso that in	fectious waste	ration
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STATE OF MARYL ID - DEPARTMENT OF HEALTH ANI ENTA HATELY ENTERNATION

Bureau of Air Quality Control

610 N. Howard Street 201 W. Preston St. FEB 25 198;
Baltimore, Maryland 21201

APPLICATION FOR PERMIT TO OPERATE INCINERATORS ADMINISTRATION

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PREMISE	E IDENTIFICATION:	* F 5	
	Walter Peed Army Institute of Research		
	Walter Reed Army Institute of Research Department of Animal Resources		983
	Division of Veterinary Medicine		
	PREMISE NAME OR IDENTIFICATION		PREMISE NUMBER
	Bldg 511, Kelser Section		Montg
			COUNTY
	PREMISE ADDRESS		
	Forest Glen, MD 20910		
EQUIPM	ENT IDENTIFICATION:		
		LBS/HR	REGISTRATION NO.
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	(B)-blodger wester memories and	(2000)	
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		350 lbs	1579200126
1	Consumat Model C-125-P		1377200120
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	equipped with automatic ram feed		
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	(Tons/Year)		
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	Chief		nimal Resources
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FIELI	D REPORT
INSPECTOR: DATE OF INSPECTI	ON: PERSON CONTACTED:
	1102 Mr Watson
DISCUSSION, CONDITIONS AND RECOMMENDATION:	A AND THE STATE OF
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MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS

Air Management Administration
O'Conor Building
201 W. Preston Street
Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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DEPARTMENT OF HEALTH AND MENTAL HYGIENE OFFICE OF ENVIRONMENTAL PROGRAMS 201 W. PRESTON STREET BALTIMORE, MARYLAND 21201 Charles R. Buck, Jr., Sc.D. Secretary

William M. Eichbaum Assistant Secretary for Environmental Programs

Construction Permit XX Operat	ting Permit DHS Facility Permit
PERMIT NO. 0-00983-00126	Date Issued <u>Harch 3, 1981</u>
	expiration Date <u>Harcia 2, 1982</u>
LEGAL OWNER & ADDRESS Walter Reed Army Institute of Research Bldg. 511, Kelser Section Walter Reed Army Medical Center Forest Glen, Maryland 20012 Attn: Mr. Vernon Cowell	Same Hontgomery County
INSTALLATION DES	
Consumat Model C-125-P rated at with automatic ram feed.	350 lbs/hr. equipped

XAdministrator; Aic Quality Programs: Acting Director

Air Management Administration

- - /m. - - - 701 DIMMU 1800

Assistant Secretary for Environmental Programs

(NOT T D-80 RABLE)

D - DEPARTMENT OF HEALTH AND ENTAL HYGIENE
Environmental Health Administration
Bureau of Air Quality Control
610 N. Howard Street
Baltimore, Maryland 21201



APPLICATION FOR PERMIT TO OPERATE INCINERATORS THE AIR QUALITY

•		THE CONTROL
I. PREM	ISE IDENTIFICATION:	
_	Randall Building - Kelser Section PREMISE NAME OR IDENTIFICATION Walter Reed Army Medical Center, Forest Glen, Anne 9100 Brookville Road, Silver Spring, Md. PREMISE ADDRESS	Bldg. 511 PREMISE NUMBER X Montg. COUNTY
II. EQUI	PMENT IDENTIFICATION:	
יישיי.	TYPE EQUIPMENT (By-product wasta, municipal, etc.) LBS/HR (Design)	REGISTRATION NO.
1	Pathological (Model, C-125-P) 350	
	OUNT AND DESCRIPTION OF WASTE BEING INCINERATED	
III. AMU	ON I AND DESCRIPTION OF WASTE BEING INCINERATED.	•
<u>UNIT</u>	AMOUNT DESCRIPTION OF WASTE (Fors/Year)	
- 1	200 Animal Carcasses and Parts	·
2		
DESC	CRIPTION OF AIR POLLUTION CONTROL DEVICE	
UNIT	TYPE CONTROL DEVICE	GRAIN LOADING (at 12% CO ₂)
- T	After Burner; Air Modulation	0.03
2		
v. 🗖	Yes No ON-SITE TESTS PERFORMED	N/A
_	Has been tested by independent testing laboratory JOHN C. CURRY Chief Animal Hubbandma Dept Anmil Resour	Date
_	3 July 1979	CES, WRAIR RE AND TITLE
. .		DATE
	D-81	· ·

AQC-27 April 1, 1973

FIELD REPORT

Douglas Frantz 3/2/81 10:00 AM Mr. Vernon Cowell

DISCUSSION, CONDITIONS AND RECOMMENDATION:

This incinerator equipped with automatic loading device. Unit charged with approximately 150 lbs of animals and bedding. No visible emission noted at any time, This is a new incinerator and this was the first time it was used in normal operation. Recommend issuance of one-year permit.

Douglas & Jants

MARYLAND STATE DEPARTMENT OF HEALTH AND ME, AL HYGIENE ENVIRONMENTAL HEALTH ADMINISTRATION

Air Quality Programs
, O'Conor Building
201 W. Preston Street
Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

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	ENVIRONMENTAL	ALTH AND MENTAL HYO HEALTH ADMINISTRATI		
ries R. Buck, Jr., Sc.D. Secretary		PRESTON STREET IE, MARYLAND 21201	Max Eisenbe Acting Di	
			•	
X Construction Permit		Operating Permit	DHS Fac	ility Permit
PERMIT NO. 15-79-2-00120	.	_	July 17, 1979	
PERMIT NO. 13-79-2-0012	<u></u>	. Date Issued	July 17, 1977	
PERMIT FEE None		Expiration Date	In accordance with	COMAR
LEGAL OWNER &	ADDRESS		SITE	
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APPENDIX E SUMMARY OF COST-BENEFIT ANALYSIS

F. RESULTS

Alternatives are ranked by net present value:

Alterna	<u>tive</u>	<u>NPV</u>	<u>EUAC</u>
(2)	Construction (Full-funded)	\$468,929	\$45,059
(6)	Construction (Incremental)	\$477,019	\$45,837
(1)	Status Quo/Minimal Renovation	\$515,851	\$49,568
(4)	Renovate Building 40	\$518,699	\$49,842
(3)	Off-Site Lease	\$562,227	\$51,917
(5)	University Contracts	\$629,771	\$58,149

NET PRESENT VALUE (NPV) is the sum of all differential costs and benefits associated with an alternative, over the LIFE-CYCLE and according to the time value of money.³ It is the "present VALUE" amount needed to finance all costs of an investment option over the period of comparison. Alternative 2, (Full-funded Construction) has a NPV of \$468,929 K A simple way of understanding this figure is to say "The government could invest \$468,929,000 dollars today, at 83 percent to meet all costs associated with this alternative over the LIFE-CYCLE." (The government would have \$0 left at the very end of the period of analysis - 25 years).

- 1 All costs are total dollar NPV's except for Research Salaries and Research Supplies, which are presented as differential costs among alternatives. Costs that are identical among alternatives ("wash', costs) and costs that have already occurred ("sunk" costs) are not included in an economic analysis.
- 2 Life-cycle refers to the period over which costs and benefits are compared or "period of analysis". The period of analysis for this project is 25 years.
- 3 The time value of money refers to "present value" or "discounting". The discount rate for this analysis is 83 percent. Thus, the government's "time value of money" is 8.3 percent. All future costs and benefits incurred by the government, by implementing a particular alternative are calculated in terms of this 83 percent rate.

Alternative 6 (Incremental Construction) has a NPV of \$477,019,000. To meet all of the costs associated with this alternative, the government would require \$8,090,000 more than alternative 2 (Full -funded Construction) to meet all life -cycle costs.

The following chart, organized from least cost to greatest cost, summarizes the difference between the alternatives compared (\$K):

		NPV	Percent
	<u>NPV</u>	Difference \$s	Difference %
Construction (Full-funded)	468,929		
Construction (Increment)	472,224	8,090	1.7
Status Quo/Min Renovation	515,851	46,922	10,1
Renovate Bldg 40	518,699	49,770	10.6
Off-Site Lease .	562,227	93,298	19.9
University	627 242	158,313	33.8

APPENDIX F PLANT AND ANIMAL SPECIES POTENTIALLY INHABITING THE AREA AROUND THE FOREST GLEN SECTION

Mammals of Rock Creek Basin, Maryland (Data taken from Rogers, Golden and Halpern, 1990)

Common Name Scientific Name

OpossumDidelphis marsupialis virginianaPigmy shrewMicrosorex hoyi winnemanaShort-tailed shrewBlarina brevicauda kirtlandi

Least shrewCryptotis parvaEastern moleSalopus a. aquaticusStar-nosed moleCondylura c. cristata

Eastern cottontail Syvivlagus floridanus mallurus

Eastern chipmunk Tamias striatus Woodchuck Marmota m. monaz

Red squirrel Tamiascriurus hunsonicus l oquax Eastern gray squirrel Sciurus carolinensis pennsylvanicus

Flying squirrel Glaucomys v. volans

White-footed deer mouse Peromyscus leucopus novaboracensis

Beaver Castor canadensis

Eastern wood rat
Meadow vole
Microtus p. pennsylvanicus
Pine vole
Pitymus pinetorum scalopsoides
Muskrate
Ondatra zibethicus macrodon
Roof rat
Rattus rattus alexandrinus

Norway rat Rattus norvegicus
Black rat Rattus rattus
House mouse Mus musculus

Meadow jumping mouse Zapus hudsonius americanus

Red fox Vulpes vulpes fulva

Gray fox Urocyon c. cinereoargenteus

Raccoon Procyon I. Iotor

Eastern pipistrelle

Long-tailed weasel
Striped skunk
Mephitis mephitis nbigra
White-tailed deer
Odocoileus virginianus borealis
Silver haire d bat
Big brown bat
Hoary bat
Evening bat
Mustela frenata noveboracensis
Mephitis mephitis nbigra
Odocoileus virginianus borealis
Lasionycteris noctivaans
Eptesicus f. fuscus
Lasiurus c. cinereus
Nyctceius h. humeralis

Pipistrellus s. subflavus

Dominant Plant Species Along Wetlands at Forest Glen (Data taken from Rogers, Golden and Halpern, 1990)

Common Name	Scientific Name	<u>Indicator</u>
<u>Status</u>		
Box Elder	cer negundo	FAC+
Rue Anemone	Anemonella thalictroides	NI
Ironwood	Carpinus caroliniana	FAC
Spring Beauty	Claytonia virginica	FACU
Beech	Fagus grandifolia	FAC+
Ground Ivy	Glechoma hederacea	FACU
Day Lily	Hemerocallis fulva	NI
Spicebush	Lindera benzoin	FACW
Tulip Poplar	Liriodendron tulipifera	FACU
Japanese Honeysuckle	Lonicera japonica	FAC
European Fly Honeysuckle	Lonicera xylosteum	NI
American Sycamore	Platanus occidentalis	FACW
May Apple	Podophyllum peltatum	FACU
Japanese Knotweed	Polygonum cuspidatum	FACU
Ornamental Cherry	Prunus sp.	NI
White Oak	Quercus alba	FACU
Red Oak	Quercus rubra	FACU
Lesser Celandine	Ranunculus ficaria	NI
Key:		
FAC = Facultative	Equally likely to occur in wetlands or nonwetlands.	

FACU = Facultative Usually occur in nonwetlands, but occasionally found in Upland wetlands

FACW = Facultative

nonwetlands.

Usually occur in wetlands, but occasionally found in

Wetland

NI = No Indicator

status.

Insufficient information available to determine an indicator

NL = Not Listed Not listed in National List of Plant

Species that Occur in Wetlands; may be an upland plant.

Fishes Collected in Rock Creek, Maryland (Data taken from Rogers, Golden and Halpern, 1990)

Common Name Scientific Name Anguilla rostrata American eel Brown trout Salmo trutta

Blacknose dace Rhinichthys atratulus Rhinichthys cataractae Longnose dace Rosyside dace Cloinostomus funduloides

Rosyface dace Notropis rubellus Cutlips minnow Exoglossum maxillingua Fallfish Semotilus corporalis Creek chub Semotilus atromaculatus

Golden shiner Notemigonus crysoleucas Cyprinus carpio Carp Notropis hudsonius Spottail shiner

Notropis spilopterus Spotfin shiner Silverjaw minnow Ericymba buccata Common shiner Notropis cornutus Swallowtail shiner Notropis pocne Satinfin shiner Notropis analostanus White sucker Catostomus commersoni Hogsucker Hypentilium nigricans Yellow bullhead Ictalurus natalis

Ictalurus punctatus Channel catfish Margined madtom Noturus insignia Large mouth bass Micropterus slamoides Pupkinseed sunfish Lepomis gibbosus Bluegill sunfish Lepomis macrochirus Green sunfish Lepomis cyanellus Lepomis auritus Redbreast sunfish

Ethostoma olstedi Percina peltata Shield darter Mottled sculpin Cottus bairdi

Tessellated darter

Tree Species at Forest Glen (Data taken from Rogers, Golden and Halpern, 1990)

Common NameScientific NameFirAbies sp.

Norway maple Acer platanoides

Maple Acer sp.
Hickory Carya sp.
Dogwood Cornus sp.
Beach Fagus sp.
Ash Fraxinus sp.
Ginkgo Ginkgo sp.
Walnut Juglans sp.

Tuliptree Liriodendron tulipifera

Magnolia Mangolia sp. Mulberry Morus sp. Spruce Picea sp. Pine Pinus sp. Pinus strobus Eastern white pine Planetree Platanus sp Poplar Populus sp. White oak Quercus alba Northern red oak Quercus borealis Oak Quercus sp.

Black locust Robina pseudoacacia

Honeylocust Gleditsia
Willow Salix sp
Linden Tilia sp
Forsythia Forsythia
Sugar maple Acer saccharum
Flowering dogwood Cornus florida

Washington hawthorn Crataegus phaenopyrmn
Saucer magnolia Magnolia soulangeana
Scotch pine Pinus sylvestris

Kwanzan Japanese cherry Prunus serrulata kwanzon

Pin oak Quercus palustris
Willow oak Quercus phellos
Japanese pagoda tree Sophora japonica
American holly Ilex opaca

Weeping cherry Prunus subhirtella pendula

Eastern hemlock Tsuga canadensis
White fringe tree Chiana nthus virginicus

Higan che

Japanese zilcova Mountain ash Callery pear Wild cherry Red cedar Sour gum

Zelcova serrata Sorbus aucuparia Pyrus calleryana Prunus sp. Juniperus viginiana Nyssa sp.

F-5

Amphibians and Reptiles of Rock Creek Basin, Maryland (Data taken from Rogers, Golden and Halpern, 1990)

Common Name Scientific Name

Eastern newt Notophthalmus viridescens Spotted salamander Ambystoma maculatum Marbled salamander Ambystoma opacum Desmognathus fuscus Dusky salamander Toe-lined salaman der Erycea bislineata Long-tailed salamander Erycea longicauda Four-toed salamander Hemidactylium scutatum Red-backed salamander Plethodon conereus Plethodon glutinosus Slimy salamander Mud salamander Pseudotriton montanus Red salamander Pseutotriton ruber American toad Bufo americanus Fowler's toad Bufo fowleri Northern cricket frog Acris crepitans Spring peeper Hyla crucifer Gray treefrog Hyla versicolor Northern chorus frog Pseudacris triseriata Bullfrog Rana catesbeiana Green frog Rana clamitans Pickerel frog Rana palustris

Rana svvatica Wood frog Leopard frog Rana pipiens Eastern fence lizard Scelporus undulatus Five-lined skink Eumeces fasciatus Worm snake Carphophis amonenu Black racer Coluber constrictor Ringneck snake Diadophis punctatus Com snake Elaphe guttata Black rat snake Elaphe obsolete Hognose snake Heterodon platyrhino Lampropeltis calligast Mole snake King snake Lampropeltis getulus Milk snake Lampropeltis trangul Water snake Natrix sipedon Rough green snake Opheodrys aestivus

Queen snake
Regina septemvittata
Brown snake
Storeria dekayi
Ribbon snake
Thamnophis sauritus
Garter snake
Thamnophis sirtalis
Smooth earth snake
Virginia valeriae
Copperhead
Agkistrodon contortri

F-6

Snapping turtle Painter turtle Spotted turtle Box turtle Eastern mud turtle Stinkpot Chelydra serpentine Chrysemys picta Clemmys guttata Terrapene Carolina Kinosternon subrubru Sternotherus odoratu

Threatened and Endangered Species within Montgomery County Maryland and Rock Creek Park (Data taken from Rogers, Golden and Halpern, 1990)

Common Name Scientific Name

Animals:

Bald eagle Haliaeetus leucocephalus
Hay's spring amphibod Stygobromus hayi
Least weasel Mustela nivalis
Sedge wren Cistothorus platensis
Six-banded longhorn beetle Dryobius sexnotatus

Plants:

Blue scorpion-weed Phacelia ranunculacea

Deciduous holly Ilex decidua

Featherbells Stenanthium gramineum Grass-like beakrush Rhynchospora globularis

Purple fringeless orchid Platanthera flava

Virginia false-gromwell
Virginia mallow
Sida hermaphrodite
Yellow nailwort
Paronychia virginica

F-8

APPENDIX G LETTER FROM THE FOREST GLEN PARK CITIZENS ASSOCIATION TO THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

FOREST GLEN PARK COMMUNITY ASSOCIATION

Community Input on Walter Reed Army Medical Center (WRAMC) Revised Master Plan

April 2, 1992 MCPPC Meeting

We are pleased to say that we do not object to WRAMC's Revised-Master Plan as it relates to their Forest Glen *Annex*. WRAMC made significant concessions to our community and the surrounding communities.

They declared the Historic District excess, which will facilitate other uses of the property that will result in preservation. They excessed a 10 acre wooded-parcel that is being transferred to the Rock Creek park system They took reasonable steps to mitigate traffic and other environmental concerns. They did all that we asked them to do to gain our non-objection to their plans.

Concerns still remain and we are confident that they can be addressed in the same spirit that brings us to this place today. The development will bring some negative impact. However, It is critical for people to bear in mind the importance of the research 'function that will be coming to our neighborhood when evaluating the impact.

We ask that WRAMC contact us whenever they think we may have concerns. We ask that the building contractors be closely monitored so they do not make mistakes with the bulldozers. Every tree and every bush that can reasonably be saved should be. The goal should be to make the *Annex* a beautiful place.

We think this is a model of good community-government interaction. Rather than approaching their proposal with flat objection as is so often the case in our society, we all collaborated and compromised. The county government, WRAMC, our congressional office, the National Capital Planning Commission, and many other agencies all listened and acted accordingly. It would be a better world if all proposals could be settled like this one was.

There is no limit to what reasonable people can accomplish.

Andy Clark President, Forest Glen Park Citizens Association 2922 Woodstock Avenue

Silver Spring, Maryland 20910 301 -585-4423 (h) 202-752-2845 (w)

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APPENDIX H DRAFT EA PUBLIC INVOLVEMENT

DRAFT EA PUBLIC INVOLVEMENT

I. Recipients of Notice of Availability (NOA) and EA Executive Summary

State Delegate Leon G. Billings 226 Lowe House Office Building Annapolis, MD 21401 -1991

The Honorable Beverly B. Byron. 2430 Rayburn House Office Building Washington, DC 20515

The Honorable John Glenn 503 Hart Senate Office Building Washington, DC 20510

State Delegate John Adams Hurson 224 Lowe House Office Building Annapolis, MD 21401-1991

Carl Levin, Chairman Subcommittee on Oversight of Government Management 442 Hart Senate Office Building Washington, DC 20510

The Honorable Barbara A. Mikulski 320 Hart Senate Office Building Washington, DC 20510

The Honorable Constance A. Morella 1024 Longworth House Office Building Washington, DC 20515

The Honorable Eleanor Holmes Norton 1631 Longworth House Office Building Washington, DC 20515

The Honorable Senator Paul S. Sarbanes 332 Dirksen Senate Office Building Washington, DC 20510 State Senator Patricia R. Sher PW James Senate Office Building Annapolis, MD 21401-1991

State Delegate Christopher VanHollen Jr. 223 Lowe House Office Budding Annapolis, MD 21401-1991

Office of the Governor 3 01 West Preston Street Baltimore, MD 21224

Maryland Department of the Environment 2500 Broening Highway Baltimore, MD 21224

Maryland Department of Natural Resources 580 North Taylor Avenue Annapolis, MD 21401

Maryland Department of Transportation P.O. Box 8755 Baltimore-Washington International Airport, MD 21240

Superintendent Montgomery County Public Schools 850 Hungerford Road Rockville MD 20850

Montgomery Journal 2 Research Court Rockville MD 20850

Montgomery Sentinel P.O. Box 1272 Rockville, MD 20849-1272

U.S. Environmental Protection Agency 841 Chestnut Building (3E543) Philadelphia, PA 19107 The Washington Post 1150 15 Street, N.W. Washington, DC 20071

II. Recipients of NOA and Draft EA

Swam Ayya Montgomery County Planning Board Maryland-National Capital Park and Planning Commissi on 8787 Georgia Ave. Silver Spring, MD 20910

Gus Bauman, Chairman Montgomery County Planning Board Maryland-National Capital Park and Planning Commission 8787 Georgia Avenue Silver Spring, MD 20910

DC Department of Consumer and Regulatory Affairs Housing and Environmental Regulation Administration 614 H Street, N.W. Washington, DC 20001

Edward U. Graham, Director Montgomery County Department of Environmental Protection 101 Monroe Street, 6th Floor Rockville, MD 20850

Executive Office of the Mayor 1350 Pennsylvania Avenue Washington, DC 20001

Neal Potter, County Executive Montgomery County 101 Monroe Street, 2nd Floor Rockville MD 20850

Jeremy Rifkin Foundation on Economic Trends 1130 17th Street, N.W. Suite 630 Washington, DC 20036

III. Recipients of Draft EA by Request

Sue Battle Maryland Department of the Environment 2500 Broening Highway Baltimore, MD 21224

Randolph W. Shotwell Smith, Hinchman & Grylls Associates, Inc. 601 13th Street N.W., Suite 250 North Washington, DC 20005

IV. Libraries Receiving the Draft EA

Martin Luther King Memorial Library Sociology, Education, and Government 901 G Street, N.W. Washington, DC 20001

Shepherd Park Library 7420 Georgia Avenue, N.W. Washington, DC 20307

Rockville Regional Library Government Information Center 99 Maryland Avenue Rockville MD 20850

Wheaton Regional Library 11701 Georgia Avenue Wheaton, MD 20902

V. Newspapers in which Notices of Availability were Published

Montgomery Journal 2 Research Court Rockville MD 20850

Montgomery Sentinel P.O. Box 1272 Rockville MD 20849-1272 The Washington Post 1150 15th Street NW Washington, DC 20071

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WITH THE ISSUE OF NOVEMBER 18, 1992.

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20TH DAY OF NOVEMBER, 1992

FER 23 1994

(SEAL)

MY COMMISSION EXPIRES

NOTICE OF AVAILABILITY - MONTGOMERY SENTINEL

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OFFICE OF The Montgomery County Sentinel 11-191992 ROCKVILLE, MD THIS IS TO CERTIFY, that the annexed advertisement of Notice was published in THE MONTGOMERY COUNTY SENTINEL, a weekly newspaper published in Montgomery County, Maryland, once a week for successive weeks before the 20th day of November 1992 and that the first publication was the 194November, 1992 day of The Montgomery County Sentinel By Shony 9. Sanderson

NOTICE OF AVAILABILITY - WASHINGTON POST

PROOF OF PUBLICATION

The Washington Post

District of Columbia, ss., Personally appeared before me, a Notary Public in and for the said District, John W. Graf well known to me to be Manager, Advertising Accounts Receivable of The Washington Post, a daily newspaper printed and published in the City of Washington, District of Columbia, and making oath in due form of law that an advertisement containing the language annexed hereto was published in said newspaper on the dates mentioned in the certificate herein.

I Hereby Certify that the attached advertisement was printed and published in The Washington Post, a daily newspaper, upon the following dates at a cost of \$2,094.00.

Dates 11/03/92,11/05/92,11/07/92 Account 216921476763

Witness my hand and official seal this 18th day of Novembe 19 92

My commission expires Oct 1 1993

NOTICE OF AVAILABILITY
Draft Environmental Assessment for
The Walter Reed Army Institute of Research
Leased Facilities

The Walter Reed Army Institute of Research (WRAIR) announces the availability of the Draft Environmental Assessment (EA) of the WRAIR Leased Facilities for public reveiw and comment. The proposed action and subject of the EA is the continuation of work, under funding from, and the direction of, the U.S. Army Medical Research and Development Command (USAMRDC), at the WRAIR Leased Facilities which are located at 13 Taft Court, Suite 201, Rockville, Maryland, (Division of Retrovirology) and 9620 Medical Center Drive, Suite 200, Rockville, Maryland, (Department of Cellular Immunology). The WRAIR is the lead Department of Defense (DoD) medical research laboratory for protecting, diagnosing, and treating service men and women from naturally occurring infectious diseases fo particular significance for military operations. The WRAIR Leased Facilities support the USAMRDC by providing reseach and diagnosis of infectious agents for which no licensed vaccines are available (including HIV). The activities of the WRAIR Leased Facilities are conducted under three programs funded by Congress and implemented through the DoD by the Army. These programs include the Infectious Disease Research Program (IDRP), the military Human Immunodeficiency Virus Research Program

(HIVP), and the medical Biological Defense Research Program (BDRP). The activities conducted by the WRAIR Leased Facilities lead to and support development, procurement and fielding of medical materiel (e.g., vaccines, diagnostics, drugs, and input to doctrine) used by the DoD to protect at-risk personnel including deployed military personnel and laboratory personnel. Some of the activities which are conducted at the WRAIR Leased Facilities require the use of special containment facilities. The EA is tiered, in part, to the Biological Defense Research Program's Final Programmatic Environmental Impact Statement (BDRP FPEIS), April 1989 (Record of Decision, November 1989). Impacts discussed in the EA are not considred to have any significant adverse effects upon the quality of the environment.

The WRAIR Leased Facilities Draft EA is available for public review and comment. Copies are available at the Rockville Regional Library, 99 Maryland Avenue, Rockville, Maryland 20850 and at the Twinbrook Branch of the Montgomery County Public Library, 202 Meadow Hall Drive, Rockville, Maryland 20851. A copy of the document may be obtained by writing to: Director, Walter Reed Army Institute of Research, Attention: SGRD-UWZ-X, Colonel Kenneth E. Spencer, Department of the Army, Washington, D.C. 20307-5100. Written comments should be submitted to the same address. Written comments for consideration in preparing the Final EA must be received no later than December 2, 1992.

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APPENDIX I PUBLIC COMMENTS ON THE DRAFT EA AND RESPONSES TO THE COMMENTS

Montgomery County Government

December 17, 1992

Director, Walter Reed Army Institute of Research ATTN: SGRD-UWZ-X Colonel Kenneth E. Spencer Department of the Army Washington, DC 20307-5100

Dear Sir:

I have been requested by the County Executive, Neal Potter, and Edward U. Graham, Director, Department of Environmental Protection, to provide appropriate comments on the draft Environmental Assessment for the new WRAIR facility at Forest Glen. The proposed relocation of the facility from the WRAIR Main campus to Forest Glen is acceptable. However, we would like to have you reconsider the characterization of the existing air quality situation in the county and the Washington Metropolitan Area.

The U.S. EPA has classified the Washington, D.C., expanded MSA as seriou s for ozone. A major effort is underway by the Metropolitan Washington Air Quality Committee, the Governors of Maryland and Virginia and the Mayor of the District of Columbia to revise the respective State Implementation Plans. The MWAQC is in the process of defining the control measures for area, point and mobile sources of volatile organic compounds and oxides of nitrogen. The implementation of these measures is expected to lead to attainment of the National Ambient Quality Standard for ozone in 1999. (DEP's ozone brochure and the section on Washington, DC-MD-YA from the National Air Quality and Emissions Trends Report 1990 which shows the geographic area covered, are enclosed.)

SIP revision measures will lead to major new transportation choices for duty personnel and others resident or visiting the Forest Glen. These measures will mean a significant switch from single occupant gasoline powered vehicle usage to multiple occupant vehicles and alternatively fueled vehicles. These alternatively fueled vehicles will be required for both private commuting vehicles and fleet vehicles of the command. Your agency should obtain information about the process and the opportunities for meaningful participation in the development of the measures being considered for inclusion in the DC and Maryland SIPs.

Department of Environmental Protection 101 Monroe Street Rockville, Maryland 20850-2589 Director, Walter Reed Army Institute of Research Page 2

SIP revisions are due in November 1993 for demonstration of a 15 percent reduction in volatile organic emissions by November 1996 and 3 percent each year thereafter until 1999. In November 1994, the major SIP revisions are due to demonstrate attainment of the National Ambient Air Quality Standard for ozone by November 1999.

Sincerely,

James A. Caldwell, Chief Office of Environmental Policy and Compliance

Enclosures

cc: Neal Potter

William H. Hussmann Edward U. Graham

WRAIR-EA.LTR/GE-1151/CECC-5568/2

Response to Comments from the Montgomery County Government Department Of Environmental Protection (#1)

- 1-1 The air quality classification of the Washington metropolitan region pursuant to the Clean Air Act of 1990 has been corrected in the EA (see Section 4.2.5).
- 1-2 Measures which the WRAIR and the WRAMC have planned and are implementing to reduce ozone precursors have been included in the EA (see Section 5.2.17 2). As federal activities, the WRAIR will participate in meeting the requirements of the Clean Air Act Amendments of 1990. The WRAIR will take part in car pooling programs and a percentage of the government vehicles traveling to and from the WRAIR will be powered by alternative fuel sources.



December 22, 1992

Director Walter Reed Army Institute of Research ATTN: SGRD-UNZ-X Colonel Kenneth E. Spencer Department of the Army Washington, D.C. 20307-5100

Dear Sir:

We have reviewed the "Draft Environmental Assessment for the Walter Reed Army Institute of Research" pertaining to the WRAIR facilities at the Main and Forest Glen locations.

On April 2, 1992, the Montgomery County Planning Board provided review and comment on the Revised Master Plan, Forest Glen Section, Walter Reed Army Medical Center. At that time Glan Section, Walter Reed Army Medical Center. At that time several recommendations were made by the Planning Board regarding the WRAIR facility at Forest Glan and a Memorandum of Understanding (MOU) was executed among the Walter Reed Army Medical Center, Montgomery County Planning Board and the National Capital Planning Commission. We recommend that you continue to carry out the described recommendations. A copy of the MOU is enclosed for your information. your information.

Thank you for providing us the opportunity to review and comment. We appreciate your allowing us to submit late comments beyond the 30-day comment period. If you need more information on this matter, please contact Swam Ayya at 301/495-4540.

Robert W. Marriott, Jr. Montgomery County

Planning Director

Enclosure

MEMORANDUM OF UNDERSTANDING BY AND AMONG NATIONAL CAPITAL PLANNING COMMISSION. MONTGOMERY COUNTY PLANNING BOARD. AND WALTER REED ARMY MEDICAL CENTER.

This Nemorandum of Understanding (MOU) sets forth the agreement among the National Capital Planning Commission (NCPC), Montgomery County Planning Board (MCPB), and the Walter Reed Army Medical Center (WRAMC) regarding implementation of a Transportation Management Program (TMP) for WRAMC, Forest Glen Annex (FGA).

WHEREAS, NCPC's project plans submission requirements require that sponsoring agencies' TMPs incorporate the following:

- summary of existing and proposed parking by type and assignment;
- o Goals for trip reduction;
- strategies to minimize vehicle work trips and discourage single occupancy commuting;
- o Discussion of projected transportation impacts and description of mitigation measures;
- Description of applicable local, state, and regional transportation management requirements and recommendations for implementation;
- Measures for monitoring, auditing, evaluating, and adjusting.

whereas, wrame has prepared a TMP that established short-term and long-term implementation strategies and program goals.

WMERRAS, on November 4, 1991, the MCPB recommended that NCPC defer action on the proposed TMP and FGA Master Plan until all conditions explained in its transportation, historic, urban design, and environmental planning divisions memorandum of November 1, 1991 are satisfactorily resolved, including a requirement that WRAMC execute a contractual agreement to implement the TMP.

IT IS THEREFORE ACREED THAT:

- 1. WRANG will use existing operational funds or seek additional funding to achieve and maintain TMP goals and implement all TMP components, tallies, evaluations, and audits, as outlined in the attached addendum.
- 2. WRAMC will submit to NCPC and MCPB quarterly tallies and audits, and annual evaluations on the effectiveness of WRAMC's

Date_

NCPC, Executive Director

ADDENDUK

goals of the wrame Ega transportation management program

- 1. Improve the efficient use of parking spaces on FGA for WRAMC personnel, visitors, and handicapped persons.
- 2. Mitigate the traffic impacts of further FGA development on the roadways serving the WRAMC FGA (such that the level of congestion during the peak hours along the roadways serving WRAMC FGA is not worse than if development did not occur).
- 3. Maintain a "good neighbor" relationship with the surrounding Forest Glen community and a "good faith" relationship with the MCFB.

TRIP LIMITATION GOAL

The TMP shall have the following trip limitation goal: no more than 415 vehicle trips shall enter the subject property during any hour within the 7:00-9:00 a.m. peak period and no more than 506 vehicle trips shall leave the subject property during any hour within the 4:00-8:00 p.m. peak period. The trip limitation goal may be changed to account for any measurable annual fluctuations in through trips (trips passing completely through the subject property). However, such changes shall be permitted by NCFC and Flanning Board staffs only if they are justified by audits of vehicular trips on the subject property. The trip limitation goal shall be achieved and maintained no later than one year after initial occupancy of the proposed WRAIR facility.

PROGRAM COMPONENTS

The TMP shall have the following components:

- Rasic Traffic Mitigation Measures. The WRAMC shall be responsible for the provision of several basic traffic mitigation measures until such time that the NCPC and Planning Board determine that the measures are no longer appropriate or necessary. Prior to approval of the subject property's Master Plan, the WRAMC shall provide NCPC and Planning Board staff evidence that all of the basic traffic mitigation measures have commenced. The basic measures shall include:
 - a. Stagmered Work Hours. The WRAIR shall establish a stagmered work hours schedule that requires WRAIR employees in the subject property to arrive and leave work outside of the 7:00-9:00 a.m. and 4:00-6:00 p.m. peak periods.

- b. Transit and Vannool Discounts. The WRAMC shall make available to all employees on the subject property the opportunity to participate in programs established under Public Law 101-509 or its successor(s) to the full extent permitted by Department of Army Policy. The NRAMC and WRAIR will seek the authority and funding to participate in these programs.
- c. Reserved Carpool/Vanpool Spaces. The WRAMC shall reserve parking spaces for carpoolers and vanpoolers. The spaces shall be located as close to the building entrances as physically possible. The number of reserved spaces shall be increased as the demand for such spaces increases.
- d. Shuttle Service. The WRAMC shall provide a free shuttle service between Forest Glen Metrorail station and the subject property during at least the morning and evening peak periods operating at 15 minutes or less headways as participation warrants. If and when a light-rail line is completed on the Georgetown Branch, the WRAMC shall also provide a similar shuttle service to and from the station closet to the subject property.
- e. Personalized Rideshare Metching Service. The WRAMC shall participate in any personalized rideshare matching service that may be established for the Silver Spring/Takome Park Policy Area. If a personalized Silver Spring/Takome Park pregram does not exist just prior to the time the Master Plan is to be approved, then the WRAMC shall immediately implement its own in-house matching service. Details of the service, which shall be comparable to other privately-sponsored Share-A-Ride programs in Montgomery County, shall be approved by Planning Board staff.
- I. Emergency Rides. WRAMC, and tenant organizations, shall provide free rides in cases of coessional family emergencies for carpoolers, vanpoolers and transit user as it becomes the policy of their Major Army Command.
- 2- Back-Up Traffic Mitigation Measures. If one or more of the 'sic traffic mitigation measures fails to operate as quired and/or the trip limitation goal is not as aved or maintained, the WRAMC shall immediately is immediately in addition to the basic measures, selficient back-up measures to remedy the problem.

Back-up measures may include: 1) more frequent shuttle services from the existing forest Glen Metrorail station and the possible light-rail station serving the subject property, 2) policies to allow telecommuting, and 3) additional measures that may be suggested by the WRAMC and approved by NCFC and Planning Board staffs.

- Transportation Coordinator. The WRAMC has designated the Assistant Chief of Staff of Support Services Administration to serve as transportation coordinator. The coordinator shall promots and administer the basic and back-up traffic mitigation measures, as appropriate.
- 4. Bus Sheltars. Upon commencement of construction of the proposed WRAIR building on the sits, the WRAMC shall install bus shelters at all unprotected bus stops on the subject property. The shelters shall be equipped with wooden benches and shall otherwise conform with specifications approved by MCDOT, unless prohibited by law.

QUARTERLY TALLIES AND ANNUAL EVALUATIONS

Immediately efter commencement of the basic traffic mitigation measures and on an en-going basis thereafter, the transportation coordinator shall submit to NCPC and Planning board staff quarterly tallies on the affactiveness of each component of the TMP. The tallies shall be in a format approved by NCPC and Planning Board staffs. The coordinator shall also submit an annual evaluation report to the Planning Board.

AUDITS

The NCPC and Flanning Board staff shall sudit the TMP by reviswing results of vehicular counts at all reads entrance and exits on the subject property during the peak periods. The counts shall be performed quarterly. The WRANC shall make annual payments to a contractor, acceptable to NCPC and Planning Board staff, to conduct the counts in accordance with a format and schedule approved by NCPC and Planning Board staff. The results of the audits, averaged over a six-month period, shall be used to determined achievement and maintenance of the trip limitation goal.

Response to Comments from the Maryland-National Capital Park and Planning Commission (#2)

1-1 The WRAMC has prepared a Transportation Management Plan to establish goals and strategies for mitigating traffic Impacts associated with Forest Glen development. Components of the WRAMC Transportation Management Plan include basic traffic mitigation measures such as staggered work hours, transit and vanpool discounts, reserved carpool parking spaces, shuttle service, rideshare, and emergency rides.

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